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***W. K. Prusaczyk  
J. W. Stuster  
H. W. Goforth, Jr.  
T. Sopchick Smith  
L. T. Meyer***

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NAVAL HEALTH RESEARCH CENTER  
P.O. BOX 85122  
SAN DIEGO, CALIFORNIA 92186-5122

NAVAL MEDICAL RESEARCH AND DEVELOPMENT COMMAND  
BETHESDA, MARYLAND



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W.K. Prusaczyk  
J.W. Stuster<sup>1</sup>  
H.W. Goforth, Jr.  
T. Sopchick Smith  
L.T. Meyer

Naval Health Research Center  
P.O. Box 85122  
San Diego, CA 92186-5122

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<sup>1</sup>Anacapa Sciences, Inc., P.O. Box 519, Santa Barbara, CA 93102

## SUMMARY

Problem. Among military Special Operations Forces, U.S. Navy Sea-Air-Land (SEAL) operators regularly face perhaps the greatest physical and mental challenges during missions. To determine the physical requirements of SEAL operations, it was first necessary to identify the physically demanding tasks that must be performed to achieve mission success.

Objective. The primary objective of this study was to identify physically demanding missions and mission segments performed during SEAL operations and to rank them according to difficulty to perform, frequency of performance, and importance to mission success. A second objective was to identify and quantify the aerobic and anaerobic components of each task. The final objective was to identify the abilities that contribute to success as a SEAL operator.

Approach. Subject matter experts (SMEs) from operational platoons were interviewed regarding missions they had conducted as SEALs. Based on these interviews, we developed a preliminary inventory of the physical tasks they had performed. The inventories were sent to the SMEs for review and comment. When the inventories were judged comprehensive and technically accurate, questionnaires were developed based on the task lists. The questionnaires were composed of task statements, such as: *"Fast rope to the deck of a ship from a height of 40 feet, carrying a 50-pound pack."* SEALs rated each statement from one to seven (least to most) on difficulty to perform, frequency of performance, and importance to mission success. The individual scores for these three dimensions were then summed for each activity to obtain a "composite" score. The composite score was calculated to mitigate the effect of extremely difficult activities that

were performed very infrequently or were of little consequence to SEAL missions. We acknowledge that there are other approaches to calculating a composite score; however, we chose to give equal weight to the three components (difficulty, frequency, and importance).

SEALs also ranked 24 "abilities" (e.g., manual dexterity, memorization) in the categories of more important, important, or less important to mission success. The abilities were then ordinally ranked within each of the three categories.

Results. Eighty-two SEALs participated in the study. They averaged 11 years of SEAL experience (range = 2-28 years) with 46% having  $\geq 12$  years' experience. Of the 15 missions rated highest on the composite score, six were "overland," five were "across the beach," and four were "ship attacks." The highest ranking mission had been performed by 85% of SEALs and eight missions had been performed by more than 50% of the subjects. Of the 20 mission segments rated highest on the composite score, nine involved "lifting/dragging/carrying/climbing," six involved "walking/hiking/skiing," three involved "swimming/diving," and two involved "jumping/bumping." The highest ranked mission segment had been performed by 90% of the SEALs, while more than half had performed 18 of the 20 most important mission segments. Of the 24 abilities; teamwork, stamina, and problem-solving were the top three, in that order. None of the abilities were rated as less important.

Conclusions. To our knowledge, these data comprise the most comprehensive analysis performed to date of the physical demands of actual SEAL missions. The data will provide a basis for the development of mission-specific physical training programs.

## INTRODUCTION

Although U.S. Navy Sea-Air-Land (SEAL) personnel are fully capable of operating in terrestrial and maritime environments, they are specially trained in aquatic, particularly underwater, missions. The effectiveness of SEAL Teams as clandestine Special Operations Forces (SOF) is due, in part, to their emphasis on small unit action and autonomy in the field. SEALs take pride in their ability to operate while relying minimally on contact with base operations; however, this autonomy exacts a price. SEALs must carry extra munitions, supplies, and equipment into the field to ensure that these materials are available when required. To compensate for the necessity of this added physical burden, SEALs devote more time to training and physical conditioning than many other SOF personnel. They must maintain physical conditioning that ensures all SEALs can carry the heavy loads required and be fully capable of performing all operations swiftly and efficiently.

The primary missions of present-day SEAL Teams can be categorized broadly as: (1) beach surveys in support of amphibious operations, (2) reconnaissance and intelligence gathering, (3) rescue of downed pilots and extraction of personnel from denied territory, (4) limpet (ordnance) attacks against enemy ships and piers, and (5) direct actions against military targets on shore or at sea. The missions are composed of several segments, including planning, transit, insertion, operation, extraction, and egress. Each segment requires specific, distinct activities that are integral components of the overall mission. Today, SEALs must be prepared for a greater variety of missions, tasks, theaters of operation, technologies, and contingencies than in previous eras.

The purpose of this study was to document the physically demanding work performed by SEALs and to identify the individual abilities related to successful mission performance. Quantifying the relative difficulty, frequency, and importance of the most physically demanding missions and mission segments performed by SEALs was necessary as part of a larger project evaluating current SEAL physical conditioning practices. While data are available on the SEALs' physical conditioning practices (Prusaczyk, Goforth, & Nelson, 1991; Prusaczyk, Goforth, & Nelson, 1994), only anecdotal evidence was available to evaluate these practices in relation to the actual physical demands of SEAL operations.

This report describes a study conducted to provide systematic and detailed information about the physical stresses SEAL operators experience. The study was designed to answer the following basic questions regarding the missions performed by SEALs: (1) Which are the most difficult to perform; (2) How frequently is each performed compared to all others; (3) Which are the most important to perform; and (4) What are the most important abilities possessed by a successful operator?

## METHODS

### TASK ANALYSIS

Rationale. Data were collected by means of a systematic task and ability analysis. Initially, tasks were defined as relatively brief units of work, such as "*Fast rope to the deck of a ship from a height of 40 feet, carrying a 50-pound pack.*" This process had been used successfully in the identification of the most physically demanding tasks performed by Explosive Ordinance Disposal personnel (Stuster, Goforth, & Prusaczyk, 1993).

During the conceptual stages of the project, however, it became apparent that the individual tasks performed by SEALs, when viewed in isolation from the overall mission, may not be particularly difficult. Rather, it is the duration and sequencing of tasks, and the conditions under which the tasks are performed, that make the missions challenging. A specific SEAL task described out of the general mission context may convey little about the many difficult tasks that may have preceded it. The task may have been performed during the course of several days of similar work, under extreme environmental conditions, and often without sufficient water, food, rest, or sleep. For this reason, it was decided that it would be more appropriate, for the purposes of this study, to measure missions and mission segments rather than specific tasks.

Preliminary Interviews. The study began with a series of 2-hour interviews with 50 experienced operators assigned to SEAL Teams from Naval Special Warfare (NSW) Group ONE at Naval Amphibious Base (NAB) Coronado, California and NSW Group TWO at NAB Little Creek, Virginia. The interviews were conducted with small groups of five to six SEALs from each SEAL Team. SEALs were asked to describe the most physically demanding tasks and activities they had performed during their careers as operators.

Activity Descriptions: Missions, Mission Segments, and Thermal Stress Activities.

Preliminary lists containing descriptions of the most difficult mission were prepared based on interview notes and on data from previous studies of SEALs (Stuster & Koehler, 1989; Prusaczyk, Stuster, & Goforth, 1995). All descriptions followed the same format to facilitate systematic comparison; i.e., each description began with an action verb and was followed by an object or person, and in some cases the environmental conditions involved. A list of mission segments was prepared by selecting representative activities from the larger mission descriptions.

A typical segment description would be "*Parachute (static line) into the desert with a 150 pound pack (day temperature 110°F), then walk 75 km (47 miles) during the next seven nights.*"

When the descriptions were developed, it was recognized that many of the mission segments were made "physically" demanding by the environmental conditions under which they were performed. Therefore, a separate category of mission segment descriptions was prepared and identified as "Thermal Stress Activities."

To ensure the descriptions were technically accurate, the lists of mission, mission segment and thermal stress activity descriptions were sent to SEAL and SEAL Delivery Vehicle (SDV) Teams for review by experienced operators serving as subject matter experts (SMEs). The SMEs' comments were incorporated into revised lists and returned for review once again. This iterative process continued until the descriptions were judged technically accurate and representative of actual SEAL and SDV missions. The descriptions then were compiled into survey questionnaires.

Survey Questionnaire. The questionnaire presented the descriptions of missions, mission segments, and thermal stress activities. SEALs were asked three questions about each description and were instructed to record the number from seven-point Likert scales that best reflected their opinion and personal experiences. Figure 1 illustrates the scales and three questions which were reproduced at the top of each page of the appropriate sections of the questionnaire. Subjects were also asked to record whether they had ever actually performed each of the activities listed.



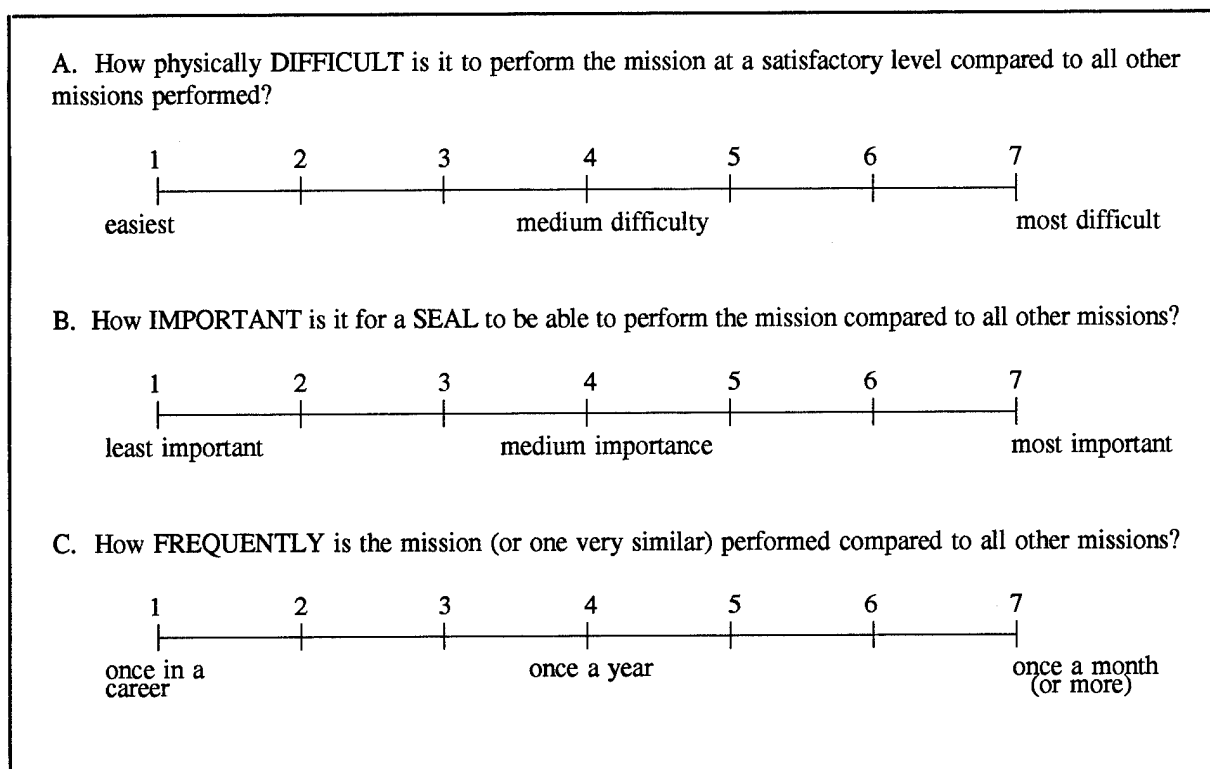


Figure 1. Seven-point Likert scales used in the questionnaires.

The descriptions of missions, mission segments, and thermal stress activities were presented in Sections 1, 2, and 3 of the questionnaire, respectively. Section 1 described 37 **missions** falling into five broad categories:

1. Overland - 13 missions composed primarily of walking and carrying heavy loads.
2. Across the Beach - 11 missions involving a transition from a cold, wet environment to a cold, dry environment.
3. Ship Attack - 6 limpet attacks involving various insertion modes.
4. Survey - 2 beach surveys.
5. Other - 5 missions including an attack on an oil platform, equipment loading onto a submarine, and three combat missions for which SEALs received Medals of Honor.

Section 2 described 50 **mission segments** falling into four categories:

1. Walking/Hiking/Skiing - 12 mission segments composed primarily of walking while carrying heavy loads.

2. Swimming/Diving - 17 mission segments involving surface or underwater swimming using an Underwater Breathing Apparatus.
3. Lifting/Dragging/Carrying/Climbing - 16 mission segments including rescue carries, carrying heavy equipment and climbing.
4. Jumping/Bumping - 5 mission segments involving fast rope or parachute for insertion.

Section 3 described 15 **thermal stress activities** consisting of mission segments which were made more difficult to perform because of extreme air/water temperature, humidity, wind, or precipitation.

Abilities Analysis. This technique has been used to identify systematically the key abilities necessary for successful performance in other Naval Special Operations personnel (Stuster, 1992; Stuster, Goforth, & Prusaczyk, 1993a; Prusaczyk, Stuster, & Goforth, 1995). SEALs completed a card-sort exercise ranking the abilities they considered important to successful SEAL performance. Each participant was given 24 "ability" cards listing specific abilities and descriptions derived from Fleishman and Quantance (1984). They were also given three "category" cards with "Less Important," "Important," and "More Important" printed on them. The category cards indicated the relative importance to being a successful SEAL. The abilities and category titles, with definitions, are presented in Appendix A.

The subjects ordered each of the ability cards behind the appropriate category card, depending on the relevance of the ability to successful performance as a SEAL. The ability cards were then ranked within each of the three categories based on their relative importance in that category.

Data Analysis. The completed questionnaires were analyzed using Microsoft Excel™. The mean difficulty, frequency, and importance scores for each mission, mission segment, and thermal stress activity were calculated from the responses on the Likert scale ratings. The individual

scores assigned to these three dimensions were then summed for each activity description and a "composite" score was calculated. The composite score was calculated to mitigate the effect of extremely difficult activities that were performed very infrequently or were of little consequence to SEAL missions. Although there are other approaches to determining the contribution of each dimension to the composite (e.g., differential weighting), equal weighting was selected for the purposes of this study. The ability analysis was performed by determining the rank of each ability and category card by its position in the assembled deck of 27 cards. The mean rank order of each card for all respondents was calculated.

## RESULTS

Participants. Eighty-two SEALs (including 10 SDV operators) from NSW Groups ONE (n=43) and TWO (n=39) participated in the study. The average years of experience as a SEAL was 11 (range = 2-28 years) with 46% having 12 or more years of experience.

Mission Analysis. The 15 missions (40% of 37 missions) with the highest mean ranking on the composite score were defined as important for determining the physical demands on SEALs. Six of these missions were "overland" missions, five were "across the beach" missions, and four were "ship attack" missions. The highest ranking mission had been performed by 85% of SEALs and eight of the 15 missions had been performed by > 50% of the subjects. The missions considered to be most important were those involving long walks while carrying heavy loads and long transits while exposed to thermal stressors (i.e., in rubber boats and SDVs), followed by further cold exposure during the remainder of the operation. Mean rankings for all composite scores are

listed in Appendix B. The mean ranking for each mission's difficulty, frequency, and importance are listed in Appendix C, D, and E, respectively.

Mission Segment Analysis. The highest rated 20 mission segments (40% of the 50) listed in the questionnaire were defined as important for this study. Nine of these mission segments involved "lifting/dragging/carrying/climbing," six were from the "walking/hiking/skiing" segments, three involved "swimming/diving," and two were from the "jumping/bumping" segments. The highest ranked mission segment had been performed by 90% of the SEALs, while more than half the subjects had performed 18 of the 20 most important mission segments. Overall, the mission segments considered to be the most important were those that involved dragging or lifting an injured person or other heavy load, walking long distances while carrying heavy loads, combat swimming tasks, and fast roping while carrying equipment. The mean composite score for each mission segment is listed in Appendix F. The mean ranking for each mission segment's difficulty, frequency, and importance are listed in Appendix G, H, and I, respectively.

Thermal Stress Activity Analysis. All 15 of the thermal stress activities listed in the questionnaire were rated among the most difficult and the least frequently performed tasks. Only 24% of SEALs had ever performed the most important thermal stress activity. Only one out of 15 thermal stress activities had been performed by more than half of the subjects. The mean computer score for each thermal stress activity is presented in Appendix J. The mean rankings for each thermal stress activity's difficulty, frequency, and importance are listed in Appendix K, L, and M, respectively.

Abilities Analysis. Table 1 shows the results of the abilities card-sort exercise.

Table 1. Rank order and mean overall score of abilities contributing to success as a SEAL.

Rank Order	Ability	Mean Score
<b>More Important</b>		
1.	Teamwork	4.68
2.	Stamina	6.36
3.	Problem solving	6.99
4.	Reaction time	8.33
5.	Assertiveness	9.97
6.	Strength	10.68
7.	Night vision	11.49
8.	Memorization	12.47
<b>Important</b>		
9	Peripheral vision	13.96
10.	Depth perception	14.06
11.	Manual dexterity	14.10
12.	Oral comprehension	14.16
13.	Far vision	14.42
14.	Near vision	15.38
15.	Arm-hand steadiness	15.64
16.	Oral expression	15.78
18.	Speed of limb movement	16.59
19.	Finger dexterity	17.50
20.	Color discrimination	18.58
21.	Written comprehension	19.05
22.	Control precision	20.77
23.	Math reasoning	21.37
24.	Written expression	21.71
<b>Less Important</b>		
	<i>No abilities in this category</i>	

Fitness Components of Missions and Mission Segments. Following the analyses of difficulty, frequency, and importance, the physical requirements of each mission and mission segment were examined for strength and endurance components. These components then were categorized by association with a body segment (e.g., arm/shoulder, abdominal). They were further evaluated for the degree to which the component contributed to the task as a "primary" or "secondary" factor. Tables 2 and 3 summarize the fitness components data, showing the percent of all missions and mission segments, respectively, requiring the specific component.

Table 2. Percent of missions/mission segments requiring specific primary and secondary fitness components.

FITNESS COMPONENTS	% of missions
<b>Primary</b>	
Aerobic endurance (primarily lower body activities)	93
Arm/shoulder strength	7
<b>Secondary</b>	
Lower limb strength	93
Neck/back strength	67
Arm/shoulder strength	67
Eccentric leg strength	53
Abdominal strength	53
Forearm/handgrip strength	27
Upper limb power	20
Lower limb power	13

Table 3. Percent of missions segments requiring specific primary and secondary fitness components.

FITNESS COMPONENTS	% of segments
<b>Primary</b>	
Aerobic endurance (primarily lower body activity)	50
Arm/shoulder strength	50
<b>Secondary</b>	
Lower limb strength	100
Neck/back strength	85
Forearm/handgrip strength	55
Abdominal strength	40
Arm/shoulder strength	35
Eccentric leg strength	30
Upper limb power	5
Lower limb endurance	5

## DISCUSSION

This analysis provides information that may guide the evaluation and development of SEAL Advanced Operational Training curricula. By identifying the most important and most frequently performed tasks, training may be aligned to reflect the relative importance of the tasks an operational SEAL may be expected to perform. In this way, operators may be prepared by this enhanced training to perform real-world missions and contribute to increased operational effectiveness. Additionally, the analysis could be used by the instructional staff during Basic Underwater Demolition/SEAL training. Students in the Third Phase of training are preparing for assignment to SEAL Teams following graduation. They must be prepared, on assignment, to

engage in the rigorous training required for SEAL missions. These students would benefit from physical training specifically developed to address SEAL mission demands prior to SEAL Team assignment.

The analysis also can be of benefit to physical training coordinators at the SEAL Teams. Recognizing the physical demands and the strength and endurance requirements of frequently performed missions and mission segments, physical fitness training programs may be modified to reflect real-world mission requirements. With the great amount of time spent in operational readiness training, SEALs can make efficient use of the limited time available for physical conditioning by preparing for mission-specific physical demands.

Systematic analyses of the missions, mission segments, and thermal stress activities performed by Navy SEALs has led to the identification of the operational and training activities that are the most difficult, the most frequently performed, and the most important to mission success. These data may be used to develop more effective physical training programs. SEAL instructors and training developers may use the list of the most important activities to ensure that the skills required to perform them are appropriately addressed in training.

The ability analysis component of this study identified key skills and abilities recognized as critical by SEALs for successful performance. Teamwork was ranked the most important ability. SEALs work in small groups; therefore, it is essential that each member of the group cooperate to accomplish the mission. Many of the missions and mission segments required cooperative effort in transporting heavy loads (e.g., a loaded Zodiac). Thus, in addition to facilitating cooperative tactical efforts, SEALs must be able to contribute physical efforts to accomplish the demanding tasks.



Stamina, the most important physical characteristic, was ranked second overall. Most of the important missions and mission segments involved long walks or swims carrying heavy loads. The analysis of fitness components indicated that 93% of all missions required aerobic endurance primarily involving lower limb activities. The large number of missions and mission segments requiring walking and/or swimming long distances indicated the importance of both muscle and cardiorespiratory endurance.

Strength is considered another of the more important physical abilities among SEALs, ranking sixth overall among the abilities. While only 7% of overall missions required upper body strength as a primary component, it was a primary component in 50% of all mission segments. Upper body strength is required for stabilizing and carrying the heavy loads required, and for dragging equipment or personnel during rescue operations. Lower body strength is essential for long hikes with loads and for overcoming the effects of gravity while landing from parachuting or fast roping. Overall, this abilities analysis provides important insight into the SEALs' own perception of the physical demands and the physical requirements to meet the demands of operational missions.

It is recommended that further research be conducted to identify the fundamental physical attributes necessary for successful mission performance as a SEAL. Further quantification of the elemental components of missions could lead to the refinement of endurance and strength conditioning programs. Such programs, targeting mission requirements, would allow selection of specific physical training techniques that enhance mission performance and thereby increase the probability of mission success.

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## APPENDIX A

## SKILLS AND ABILITIES

Category 1 - MORE IMPORTANT: The skills and abilities in this category are *exceptionally important* to the successful performance of my job.

Category 2 - IMPORTANT: The skills and abilities in this category are *important* to the successful performance of my job.

Category 3 - LESS IMPORTANT: The skills and abilities in this category are *less important* to the successful performance of my job.

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Spatial Orientation:	The ability to maintain orientation with respect to objects when you or the objects are moving.
Reaction Time:	The speed with which a single motor response can be made following the onset of a single stimulus.
Control Precision:	The ability to make fine adjustments to a knob or dial.
Arm-Hand Steadiness:	The ability to make precise, steady arm-hand positioning movements.
Manual Dexterity:	The ability to make skillful, coordinated movements of a hand together with its arm--may involve equipment, but not equipment controls.
Finger Dexterity:	The ability to make skillful, coordinated movements of the fingers--may involve equipment, but not equipment controls.
Speed of Limb Movement:	The speed with which movements of the arms or legs can be made; the speed with which the movement can be carried out after it has been initiated.
Strength:	The amount of muscular force that can be exerted.
Stamina:	The ability to maintain physical activity over prolonged periods of time.
Near Vision:	The ability to see close environmental surroundings.
Far Vision:	The ability to see distant environmental surroundings.

Night Vision:	The ability to see under low light conditions.
Color Discrimination:	The ability to match or discriminate between colors.
Peripheral Vision:	The ability to perceive objects or movement towards the edges of the visual field.
Depth Perception:	The ability to distinguish which of several objects is nearer or more distant, or to judge the distance to an object.
Oral Comprehension:	The ability to understand spoken English words or sentences.
Written Comprehension:	The ability to understand written sentences and paragraphs.
Oral Expression:	The ability to speak English words or sentences so others will understand.
Written Expression:	The ability to write English words or sentences so others will understand.
Memorization:	The ability to remember information, such as words, numbers, pictures, and procedures.
Math Reasoning:	The ability to understand and organize a problem and then to select a mathematical method or formula to solve the problem.
Teamwork:	The ability to work with others as part of a team, to anticipate what others want or need, and to cooperate.
Assertiveness:	The ability to bring a problem or important information to the attention of another crew member in a timely fashion.
Problem Solving:	The ability to perceive small details and "size-up" situations quickly and accurately, then respond with an appropriate course of action.

## APPENDIX B

## PHYSICALLY DEMANDING SEAL MISSIONS

### COMPOSITE DIFFICULTY SCORE

Mean  
Value

- 14.95 Walk (i.e., hump) 15 km (9 miles) over uneven terrain at night, carrying a 125-pound pack (with radios, etc.) in 70°F temperature to objective; then, retrace steps to extraction point. (85%)
- 14.80 Serve as point (trail breaker) for an element walking a distance of 42 km (26 miles) through dense jungle (up and down), in tropical heat and humidity, during a 3 day period, carrying a 60-pound pack and weapons. (49%)
- 14.69 Perform a "duck drop," followed by an 29 km (21 nm) transit (3 hours) in 48°F air temperature, then swim a distance of 2,000 meters in 56°F water carrying a limpet mine and using a Dräger; return to Zodiac without limpet, then travel 6 km (4 nm) to extraction point (10 hours total). (76%)
- 14.53 Walk a distance of 42 km (26 miles) through dense jungle (up and down), in tropical heat and humidity, during a 3 day period, carrying a 40-pound pack, an M-60 (17 pounds), and 400 rounds of ammunition (40 pounds). (61%)
- 14.20 Perform a "duck drop," followed by a 20 km (14 nm) transit in moderate seas and 65°F air temperature; beach and cache boat, and proceed on foot over 200 meters of strand; enter water and swim 4 km (2.8 nm) in current to objective; then, retrace steps to insertion point, during an 8-hour period. (77%)
- 14.19 Travel for 5 hours in an open rubber boat in 40°F air temperature and 30-foot swells; beach the boat, cache/stage the equipment, and change from dry suit into dry clothes; then walk 26 km (16 miles) during the next 2 nights over uneven terrain carrying an 80-pound pack, sleeping in 2-hour increments, when possible, during a continuous rain. (61%)
- 13.90 Walk a distance of 56 km (35 miles) from sea level to 4,000 feet, traversing marshy and rocky terrain (frequently on incline below the ridge line), walking at night and laying up during the day, for 3 days, carrying an 80 pound pack, in 30°F to 70°F air temperature. (55%)
- 13.89 Operate an SDV for a period of 4 hours (navigating from an offshore location to within an enemy harbor); bottom-out and secure the craft; remove LAM from storage compartment then swim 100 meters to target (with the assistance of 1 other team member); deploy the LAM; return to SDV and prepare for egress; operate SDV out of the harbor to rendezvous location; finally, dock SDV in DDS (a total of 9 hours in 65°F water, both personnel wearing wet suits). (14%)

- 13.85 Perform a "duck drop" into 39°F water, then conduct a 80 km (57 nm) over the horizon boat transit, then a 2 hour ship attack wearing wet suit and Dräger UBA; then, reboard Zodiac for 80 km (57 nm) ride to the extraction point. (43%)
- 13.75 Lock out of a submarine, then conduct a 97 km (69 nm) over the horizon transit in a Zodiac in 65°F air temperature (5 hours); enter 58°F water wearing wet suit and Dräger UBA, then swim a multi-ship limpet attack that requires 3 1/2 hours under water; reboard Zodiac for 97 km (69 nm) ride to the extraction point. (33%)
- 13.65 Walk a distance of 20 km (12 miles) over uneven, snow-covered terrain in 30°F air temperature (crossing two 20-foot streams) during a 2-day period, wearing snowshoes and winter gear, and carrying an 80-pound pack. (64%)
- 13.63 Launch and operate an SDV for a period of 2 hours, then bottom-out the craft, swim 200 meters to shore carrying 90-pounds of equipment and weights and wearing a dry suit, then proceed overland 3 km to objective; retrace steps to extraction point. (27%)
- 13.62 Walk 60 km (37 miles) through the desert during a 5-day period, carrying a 100-pound rucksack, laying up during the day in 112°F temperature and walking over uneven terrain during nighttime hours (95°F). (53%)
- 13.61 Perform a "duck drop" into 30°F waters then transit 123 km (90 nm) in a rigid inflatable boat while wearing a dry suit; enter water and swim 600 meters through surf zone to beach while carrying a 50 pound pack and weapons; cache boats and change from dry suit to winter gear on beach; hike 3 km (2 miles) up steep incline with packs; then hike all night for the next 5 nights, laying up during daylight; then, periodically help other platoon members carry downed pilot on stretcher over uneven terrain to extraction point. (23%)
- 13.53 Travel for 6 hours in a Zodiac in 0°F air temperature, then swim 600 meters in 36°F water, crossing the surf zone to the beach; change from wetsuit into winter gear and snow shoes, then walk 2 km (1.2 miles) over uneven terrain and snow to objective; retrace steps to extraction point (24 hours total). (37%)
- 13.51 Ride in a CRRC for 1 hour to reach a sandy beach; cache the boat and proceed through thick jungle for 500 yards until coming under fire from a numerically superior enemy force; return fire and call in naval gunfire support; return to CRRC to prevent encirclement; then, quickly return to the engagement area through heavy fire to retrieve a critically injured comrade; carry the unconscious SEAL back to the beach, inflate his lifejacket, then tow him seaward for the next 2 hours until picked up by support craft. (6%)
- 13.36 Conduct R&S for 5 days in a jungle environment (95°F temperature and high humidity), while carrying 60 pounds of equipment and a sniper rifle (movement restricted by thick vegetation to 50 meters per hour). (39%)



- 13.34 Ride for 3 hours in a PBR, then for 1 hour in a CRRC on a jungle river (85°F air temperature and high humidity); climb a 350 foot cliff carrying a CAR-15 and 20 pounds of ammunition; descend 200 feet through dense vegetation; avoid, return, and eventually suppress intense enemy fire; then, carry wounded comrade 200 yards to extraction site with the assistance of 2 other SEALs. (24%)
- 13.32 Operate a sampan on a jungle river for 4 hours at night; hike through uneven jungle terrain for 1 hour carrying light weapons; locate downed pilot and carry him back to the river with the assistance of 1 other person; return down river for 3 hours then evade intense machine gun fire, direct an air strike to suppress the fire, and successfully reach a forward operating base with the rescued pilot. (13%)
- 13.31 Swim on surface a distance of 6 km (3 1/2 nm) wearing full close quarter battle (CQB) gear and flotation device and carrying 25 pounds of weapons/ammunition, in 60°F water; cling to the barnacle-covered leg of an oil platform for 45 minutes (while lead climber scales the structure); then climb a 3 tier caving ladder (90 feet), quietly pulling self and equipment onto deck of platform. (24%)
- 13.09 Crawl for 3 days through a rat and mosquito infested jungle in 90°F temperature and 100% humidity, while carrying a 50 pound pack and 25 pounds of weapons and ammunition; lay up for 2 days, conduct sniper attack, then run 1 km (.62 miles) to extraction point. (19%)
- 13.06 Fast rope to the deck of a salvage ship with 60 pounds of equipment, then load 6 personnel and their equipment into 2 Zodiacs and launch the boats into 4-foot seas (30°F and 20 kt winds--all personnel wearing dry suits); proceed for 60 nm (10 hours) then take the boats through the surf, caching 1 on the beach (while the other craft and 2 personnel depart); then hump 10 km (6.2 miles) over uneven terrain with 3 other SEALs (carrying 60 pounds of equipment each); lay-up for 6 hours, then retrace steps (i.e., 10 km hump, boat through surf zone, and 10 hour ride to extraction point). (35%)
- 12.97 Conduct a 12 day final training exercise in -15°F temperature, covering 60 km (37 miles) on skis while carrying a 100 pound pack. (24%)
- 12.90 Serve as mission specialist riding in an SDV for a period of 3 hours in 68°F water, while wearing a wet suit and MK 15/16 UBA (from an offshore location to within an enemy harbor that is filled with jelly fish); open canopy then swim 50 meters to target to deploy limpets (while jelly fish repeatedly sting exposed lip area); return to SDV and sit among jelly fish in storage compartment as the SDV is operated out of the harbor to the rendezvous location (a total of 8 hours in 68°F water--2 hours in jelly fish). (15%)
- 12.84 Parachute (static line) into the desert with 150 pound packs (day temp 110°F), then walk 75 km (47 miles) during the next 7 nights. (25%)

- 12.84 Load all platoon equipment (e.g., 25 sets of twin 80s, 6 Zodiacs and 55 hp motors, 10 weapons boxes, 60 cruise boxes, para bags, radios, etc.) into a submarine via deck hatch in preparation for deployment, and secure equipment under torpedo racks, etc., with assistance of 9 other SEALs. (71%)
- 12.79 Serve as mission specialist riding in an SDV for a period of 3 hours in 65°F water, while wearing a light wet suit; exit SDV then swim 100 meters to shore; change into dry clothes then hump 2 km (1.2 miles) with 50 pound packs in 75°F air temperature; lay up overnight, then hump back to the beach for a 5-hour Zodiac extraction (a total of 2 days with only 3 quarts of water for each person). (23%)
- 12.68 Hike 110 km (68 miles) in winter gear, carrying a 60 pound pack and weapons and completing 5 mini FTXs during a 6 day period (in 25°F temperature with continuous rain and snow). (19%)
- 12.49 Ride in a Zodiac 8 km (5.75 nm) to a rocky beach in 0°F air temperature while wearing winter gear; then, during the next 9 days traverse 80 km (50 miles) of countryside (uneven terrain, briar patches) by humping (80% of the distance) and cross-country skiing (20%), while carrying a 100 pound pack and weapons. (19%)
- 12.09 Conduct an administrative beach survey in 30°F water, for 2 1/2 hours, wearing a wet suit, mask, and fins. (70%)
- 11.97 Parachute into 42°F water wearing wet suits and Dräger UBA; tread water for 4 hours waiting for small diesel submarine; enter submerged submarine; travel for 3 days in submarine, then lock out and swim 3 km (2 nm) on surface followed by 6,500 meters underwater (4 hour dive); crawl across 100 meters of rock quay, then swim 4 km (3 nm) on surface to extraction point. (15%)
- 11.82 Walk 115 km (72 miles) in 2 1/2 days carrying an M-60, 600 rounds of ammunition, and a rucksack (90 pounds total), laying up during the day (35°F temp at night and 80°F during the day). (10%)
- 11.81 Conduct a beach feasibility survey, swimming a grid pattern for 8 hours, wearing a wetsuit, mask, and fins, and using a UBA and attack board, in 56°F water. (35%)
- 11.78 Perform a "duck drop" from an altitude of 65 feet; repair deflated section of Zodiac, then proceed 56 km (40 nm) to shore; change into dry clothing and cache boats; swim 2,000 meters (in patrol clothes) towing 30 pounds of equipment; then climb a 250 foot cliff; remain on top for 2 days, then retrace steps to extraction point (50°F air temperature). (22%)

- 11.63 Perform a "soft-duck drop" then transit 48 km (35 nm) to surf zone; guide boat through 5 foot surf to shore, then push the boat along the shore line for 8 km (5 miles) with 3 other SEALs; lay up for 4 days in the jungle (mosquito coast), then drive the boat 24 km (16 nm) to pick up 4 personnel and 800 pounds of gear; return at slow speed (requiring 8 hours to go the 16 nm), then recon the target for 4 more days before extraction. (23%)
- 11.54 Parachute onto a rocky island then walk 2 km (1.2 miles) over uneven terrain to shore; retrieve cached kayak, then travel 24 km (17 nm) in rough seas to objective; travel 6 more miles in kayak, then climb a 2,500-foot mountain (mud and rocks) to the extraction point. (15%)
- 11.42 Navigate a rigid inflatable boat for 10 hours through heavy seas (30°F) with no moon while wearing a dry suit; retrieve personnel who were washed out of boat; fall out of boat and cling to outboard motor (which is operating); climb back into boat and continue operating it; crash boat on rocks then swim 200 meters through surf zone to beach carrying a 40 pound pack and weapons; change into light Gortex (winter gear lost on rocks) then hump 11 km (7 miles) over uneven terrain carrying packs and weapons; spend 2 days ashore hiking during the night and laying up during the day, with little sleep, in 35°F air temperature, wind and rain; finally, extraction by vehicle. (13%)

## APPENDIX C

## PHYSICALLY DEMANDING SEAL MISSIONS

### DIFFICULTY TO PERFORM

Mean  
Value

- 6.33 Hike 110 km (68 miles) in winter gear, carrying a 60 pound pack and weapons and completing 5 mini FTXs during a 6 day period (in 25°F temperature with continuous rain and snow).
- 6.26 Walk 115 km (72 miles) in 2 1/2 days carrying an M-60, 600 rounds of ammunition, and a rucksack (90 pounds total), laying up during the day (35°F temp at night and 80°F during the day).
- 6.22 Ride in a CRRC for 1 hour to reach a sandy beach; cache the boat and proceed through thick jungle for 500 yards until coming under fire from a numerically superior enemy force; return fire and call in naval gunfire support; return to CRRC to prevent encirclement; then, quickly return to the engagement area through heavy fire to retrieve a critically injured comrade; carry the unconscious SEAL back to the beach, inflate his lifejacket, then tow him seaward for the next 2 hours until picked up by support craft.
- 6.13 Navigate a rigid inflatable boat for 10 hours through heavy seas (30°F) with no moon while wearing a dry suit; retrieve personnel who were washed out of boat; fall out of boat and cling to outboard motor (which is operating); climb back into boat and continue operating it; crash boat on rocks then swim 200 meters through surf zone to beach carrying a 40 pound pack and weapons; change into light Gortex (winter gear lost on rocks) then hump 11 km (7 miles) over uneven terrain carrying packs and weapons; spend 2 days ashore hiking during the night and laying up during the day, with little sleep, in 35°F air temperature, wind and rain; finally, extraction by vehicle.
- 6.04 Swim on surface a distance of 6 km (3 1/2 nm) wearing full close quarter battle (CQB) gear and flotation device and carrying 25 pounds of weapons/ammunition, in 60°F water; cling to the barnacle-covered leg of an oil platform for 45 minutes (while lead climber scales the structure); then climb a 3 tier caving ladder (90 feet), quietly pulling self and equipment onto deck of platform.
- 5.96 Ride in a Zodiac 8 km (5.75 nm) to a rocky beach in 0°F air temperature while wearing winter gear; then, during the next 9 days traverse 80 km (50 miles) of countryside (uneven terrain, briar patches) by humping (80% of the distance) and cross-country skiing (20%), while carrying a 100 pound pack and weapons.
- 5.87 Parachute into 42°F water wearing wet suits and Dräger UBA; tread water for 4 hours waiting for small diesel submarine; enter submerged submarine; travel for 3 days in submarine, then lock out and swim 3 km (2 nm) on surface followed by 6,500 meters

- underwater (4 hour dive); crawl across 100 meters of rock quay, then swim 4 km (3 nm) on surface to extraction point.
- 5.86 Perform a "duck drop" into 30°F waters then transit 123 km (90 nm) in a rigid inflatable boat while wearing a dry suit; enter water and swim 600 meters through surf zone to beach while carrying a 50 pound pack and weapons; cache boats and change from dry suit to winter gear on beach; hike 3 km (2 miles) up steep incline with packs; then hike all night for the next 5 nights, laying up during daylight; then, periodically help other platoon members carry downed pilot on stretcher over uneven terrain to extraction point.
- 5.84 Conduct a 12 day final training exercise in -15°F temperature, covering 60 km (37 miles) on skis while carrying a 100 pound pack.
- 5.82 Walk 60 km (37 miles) through the desert during a 5-day period, carrying a 100-pound rucksack, laying up during the day in 112°F temperature and walking over uneven terrain during nighttime hours (95°F).
- 5.79 Lock out of a submarine, then conduct a 97 km (69 nm) over the horizon transit in a Zodiac in 65°F air temperature (5 hours); enter 58°F water wearing wet suit and Dräger UBA, then swim a multi-ship limpet attack that requires 3 1/2 hours under water; reboard Zodiac for 97 km (69 nm) ride to the extraction point.
- 5.75 Crawl for 3 days through a rat and mosquito infested jungle in 90°F temperature and 100% humidity, while carrying a 50 pound pack and 25 pounds of weapons and ammunition; lay up for 2 days, conduct sniper attack, then run 1 km (.62 miles) to extraction point.
- 5.74 Parachute (static line) into the desert with 150 pound packs (day temp 110°F), then walk 75 km (47 miles) during the next 7 nights.
- 5.73 Fast rope to the deck of a salvage ship with 60 pounds of equipment, then load 6 personnel and their equipment into 2 Zodiacs and launch the boats into 4-foot seas (30°F and 20 kt winds--all personnel wearing dry suits); proceed for 60 nm (10 hours) then take the boats through the surf, caching 1 on the beach (while the other craft and 2 personnel depart); then hump 10 km (6.2 miles) over uneven terrain with 3 other SEALs (carrying 60 pounds of equipment each); lay-up for 6 hours, then retrace steps (i.e., 10 km hump, boat through surf zone, and 10 hour ride to extraction point).
- 5.68 Travel for 5 hours in an open rubber boat in 40°F air temperature and 30-foot swells; beach the boat, cache/stage the equipment, and change from dry suit into dry clothes; then walk 26 km (16 miles) during the next 2 nights over uneven terrain carrying an 80-pound pack, sleeping in 2-hour increments, when possible, during a continuous rain.

- 5.64 Serve as point (trail breaker) for an element walking a distance of 42 km (26 miles) through dense jungle (up and down), in tropical heat and humidity, during a 3 day period, carrying a 60-pound pack and weapons.
- 5.61 Walk a distance of 42 km (26 miles) through dense jungle (up and down), in tropical heat and humidity, during a 3 day period, carrying a 40-pound pack, an M-60 (17 pounds), and 400 rounds of ammunition (40 pounds).
- 5.58 Travel for 6 hours in a Zodiac in 0°F air temperature, then swim 600 meters in 36°F water, crossing the surf zone to the beach; change from wetsuit into winter gear and snow shoes, then walk 2 km (1.2 miles) over uneven terrain and snow to objective; retrace steps to extraction point (24 hours total).
- 5.57 Perform a "duck drop" into 39°F water, then conduct a 80 km (57 nm) over the horizon boat transit, then a 2 hour ship attack wearing wet suit and Dräger UBA; then, reboard Zodiac for 80 km (57 nm) ride to the extraction point.
- 5.53 Walk a distance of 56 km (35 miles) from sea level to 4,000 feet, traversing marshy and rocky terrain (frequently on incline below the ridge line), walking at night and laying up during the day, for 3 days, carrying an 80 pound pack, in 30°F to 70°F air temperature.
- 5.53 Parachute onto a rocky island then walk 2 km (1.2 miles) over uneven terrain to shore; retrieve cached kayak, then travel 24 km (17 nm) in rough seas to objective; travel 6 more miles in kayak, then climb a 2,500-foot mountain (mud and rocks) to the extraction point.
- 5.53 Operate a sampan on a jungle river for 4 hours at night; hike through uneven jungle terrain for 1 hour carrying light weapons; locate downed pilot and carry him back to the river with the assistance of 1 other person; return down river for 3 hours then evade intense machine gun fire, direct an air strike to suppress the fire, and successfully reach a forward operating base with the rescued pilot.
- 5.43 Ride for 3 hours in a PBR, then for 1 hour in a CRRC on a jungle river (85°F air temperature and high humidity); climb a 350 foot cliff carrying a CAR-15 and 20 pounds of ammunition; descend 200 feet through dense vegetation; avoid, return, and eventually suppress intense enemy fire; then, carry wounded comrade 200 yards to extraction site with the assistance of 2 other SEALs.
- 5.43 Perform a "duck drop" from an altitude of 65 feet; repair deflated section of Zodiac, then proceed 56 km (40 nm) to shore; change into dry clothing and cache boats; swim 2,000 meters (in patrol clothes) towing 30 pounds of equipment; then climb a 250 foot cliff; remain on top for 2 days, then retrace steps to extraction point (50°F air temperature).

- 5.36 Perform a "soft-duck drop" then transit 48 km (35 nm) to surf zone; guide boat through 5 foot surf to shore, then push the boat along the shore line for 8 km (5 miles) with 3 other SEALs; lay up for 4 days in the jungle (mosquito coast), then drive the boat 24 km (16 nm) to pick up 4 personnel and 800 pounds of gear; return at slow speed (requiring 8 hours to go the 16 nm), then recon the target for 4 more days before extraction.
- 5.32 Conduct a beach feasibility survey, swimming a grid pattern for 8 hours, wearing a wetsuit, mask, and fins, and using a UBA and attack board, in 56°F water.
- 5.31 Conduct R&S for 5 days in a jungle environment (95°F temperature and high humidity), while carrying 60 pounds of equipment and a sniper rifle (movement restricted by thick vegetation to 50 meters per hour).
- 5.28 Operate an SDV for a period of 4 hours (navigating from an offshore location to within an enemy harbor); bottom-out and secure the craft; remove LAM from storage compartment then swim 100 meters to target (with the assistance of 1 other team member); deploy the LAM; return to SDV and prepare for egress; operate SDV out of the harbor to rendezvous location; finally, dock SDV in DDS (a total of 9 hours in 65°F water, both personnel wearing wet suits).
- 5.25 Walk a distance of 20 km (12 miles) over uneven, snow-covered terrain in 30°F air temperature (crossing two 20-foot streams) during a 2-day period, wearing snowshoes and winter gear, and carrying an 80-pound pack.
- 5.24 Serve as mission specialist riding in an SDV for a period of 3 hours in 68°F water, while wearing a wet suit and Mk 15/16 UBA (from an offshore location to within an enemy harbor that is filled with jelly fish); open canopy then swim 50 meters to target to deploy limpets (while jelly fish repeated sting exposed lip area); return to SDV and sit among jelly fish in storage compartment as the SDV is operated out of the harbor to the rendezvous location (a total of 8 hours in 68°F water--2 hours in jelly fish).
- 5.12 Walk (i.e., hump) 15 km (9 miles) over uneven terrain at night, carrying a 125-pound pack (with radios, etc.) in 70°F temperature to objective; then, retrace steps to extraction point.
- 5.04 Launch and operate an SDV for a period of 2 hours, then bottom-out the craft, swim 200 meters to shore carrying 90-pounds of equipment and weights and wearing a dry suit, then proceed overland 3 km to objective; retrace steps to extraction point.
- 4.99 Conduct an administrative beach survey in 30°F water, for 2 1/2 hours, wearing a wet suit, mask, and fins.
- 4.93 Perform a "duck drop," followed by a 20 km (14 nm) transit in moderate seas and 65°F air temperature; beach and cache boat, and proceed on foot over 200 meters of strand;



enter water and swim 4 km (2.8 nm) in current to objective; then, retrace steps to insertion point, during an 8-hour period.

- 4.74 Serve as mission specialist riding in an SDV for a period of 3 hours in 65°F water, while wearing a light wet suit; exit SDV then swim 100 meters to shore; change into dry clothes then hump 2 km (1.2 miles) with 50 pound packs in 75°F air temperature; lay up overnight, then hump back to the beach for a 5-hour Zodiac extraction (a total of 2 days with only 3 quarts of water for each person).
- 4.65 Perform a "duck drop," followed by an 29 km (21 nm) transit (3 hours) in 48°F air temperature, then swim a distance of 2,000 meters in 56°F water carrying a limpet mine and using a Dräger; return to Zodiac without limpet, then travel 6 km (4 nm) to extraction point (10 hours total).
- 4.24 Load all platoon equipment (e.g., 25 sets of twin 80s, 6 Zodiacs and 55 hp motors, 10 weapons boxes, 60 cruise boxes, para bags, radios, etc.) into a submarine via deck hatch in preparation for deployment, and secure equipment under torpedo racks, etc., with assistance of 9 other SEALs.

## APPENDIX D

## PHYSICALLY DEMANDING SEAL MISSIONS

### FREQUENCY PERFORMED

Mean

Value

- 4.38 Walk (i.e., hump) 15 km (9 miles) over uneven terrain at night, carrying a 125-pound pack (with radios, etc.) in 70°F temperature to objective; then, retrace steps to extraction point.
- 4.11 Perform a "duck drop," followed by an 29 km (21 nm) transit (3 hours) in 48°F air temperature, then swim a distance of 2,000 meters in 56°F water carrying a limpet mine and using a Dräger; return to Zodiac without limpet, then travel 6 km (4 nm) to extraction point (10 hours total).
- 3.90 Perform a "duck drop," followed by a 20 km (14 nm) transit in moderate seas and 65°F air temperature; beach and cache boat, and proceed on foot over 200 meters of strand; enter water and swim 4 km (2.8 nm) in current to objective; then, retrace steps to insertion point, during an 8-hour period.
- 3.83 Serve as point (trail breaker) for an element walking a distance of 42 km (26 miles) through dense jungle (up and down), in tropical heat and humidity, during a 3 day period, carrying a 60-pound pack and weapons.
- 3.74 Walk a distance of 42 km (26 miles) through dense jungle (up and down), in tropical heat and humidity, during a 3 day period, carrying a 40-pound pack, an M-60 (17 pounds), and 400 rounds of ammunition (40 pounds).
- 3.70 Load all platoon equipment (e.g., 25 sets of twin 80s, 6 Zodiacs and 55 hp motors, 10 weapons boxes, 60 cruise boxes, para bags, radios, etc.) into a submarine via deck hatch in preparation for deployment, and secure equipment under torpedo racks, etc., with assistance of 9 other SEALs.
- 3.65 Launch and operate an SDV for a period of 2 hours, then bottom-out the craft, swim 200 meters to shore carrying 90-pounds of equipment and weights and wearing a dry suit, then proceed overland 3 km to objective; retrace steps to extraction point.
- 3.57 Walk a distance of 56 km (35 miles) from sea level to 4,000 feet, traversing marshy and rocky terrain (frequently on incline below the ridge line), walking at night and laying up during the day, for 3 days, carrying an 80 pound pack, in 30°F to 70°F air temperature.
- 3.51 Operate an SDV for a period of 4 hours (navigating from an offshore location to within an enemy harbor); bottom-out and secure the craft; remove LAM from storage compartment then swim 100 meters to target (with the assistance of 1 other team

member); deploy the LAM; return to SDV and prepare for egress; operate SDV out of the harbor to rendezvous location; finally, dock SDV in DDS (a total of 9 hours in 65°F water, both personnel wearing wet suits).

- 3.49 Walk a distance of 20 km (12 miles) over uneven, snow-covered terrain in 30°F air temperature (crossing two 20-foot streams) during a 2-day period, wearing snowshoes and winter gear, and carrying an 80-pound pack.
- 3.46 Serve as mission specialist riding in an SDV for a period of 3 hours in 65°F water, while wearing a light wet suit; exit SDV then swim 100 meters to shore; change into dry clothes then hump 2 km (1.2 miles) with 50 pound packs in 75°F air temperature; lay up overnight, then hump back to the beach for a 5-hour Zodiac extraction (a total of 2 days with only 3 quarts of water for each person).
- 3.34 Travel for 5 hours in an open rubber boat in 40°F air temperature and 30-foot swells; beach the boat, cache/stage the equipment, and change from dry suit into dry clothes; then walk 26 km (16 miles) during the next 2 nights over uneven terrain carrying an 80-pound pack, sleeping in 2-hour increments, when possible, during a continuous rain.
- 3.21 Walk 60 km (37 miles) through the desert during a 5-day period, carrying a 100-pound rucksack, laying up during the day in 112°F temperature and walking over uneven terrain during nighttime hours (95°F).
- 3.07 Travel for 6 hours in a Zodiac in 0°F air temperature, then swim 600 meters in 36°F water, crossing the surf zone to the beach; change from wetsuit into winter gear and snow shoes, then walk 2 km (1.2 miles) over uneven terrain and snow to objective; retrace steps to extraction point (24 hours total).
- 3.07 Perform a "duck drop" into 39°F water, then conduct a 80 km (57 nm) over the horizon boat transit, then a 2 hour ship attack wearing wet suit and Dräger UBA; then, reboard Zodiac for 80 km (57 nm) ride to the extraction point.
- 3.06 Conduct R&S for 5 days in a jungle environment (95°F temperature and high humidity), while carrying 60 pounds of equipment and a sniper rifle (movement restricted by thick vegetation to 50 meters per hour).
- 2.98 Conduct an administrative beach survey in 30°F water, for 2 1/2 hours, wearing a wet suit, mask, and fins.
- 2.91 Parachute (static line) into the desert with 150 pound packs (day temp 110°F), then walk 75 km (47 miles) during the next 7 nights.

- 2.89 Serve as mission specialist riding in an SDV for a period of 3 hours in 68°F water, while wearing a wet suit and Mk 15/16 UBA (from an offshore location to within an enemy harbor that is filled with jelly fish); open canopy then swim 50 meters to target to deploy limpets (while jelly fish repeated sting exposed lip area); return to SDV and sit among jelly fish in storage compartment as the SDV is operated out of the harbor to the rendezvous location (a total of 8 hours in 68°F water--2 hours in jelly fish).
- 2.82 Lock out of a submarine, then conduct a 97 km (69 nm) over the horizon transit in a Zodiac in 65°F air temperature (5 hours); enter 58°F water wearing wet suit and Dräger UBA, then swim a multi-ship limpet attack that requires 3 1/2 hours under water; reboard Zodiac for 97 km (69 nm) ride to the extraction point.
- 2.69 Perform a "duck drop" into 30°F waters then transit 123 km (90 nm) in a rigid inflatable boat while wearing a dry suit; enter water and swim 600 meters through surf zone to beach while carrying a 50 pound pack and weapons; cache boats and change from dry suit to winter gear on beach; hike 3 km (2 miles) up steep incline with packs; then hike all night for the next 5 nights, laying up during daylight; then, periodically help other platoon members carry downed pilot on stretcher over uneven terrain to extraction point.
- 2.66 Conduct a beach feasibility survey, swimming a grid pattern for 8 hours, wearing a wetsuit, mask, and fins, and using a UBA and attack board, in 56°F water.
- 2.62 Fast rope to the deck of a salvage ship with 60 pounds of equipment, then load 6 personnel and their equipment into 2 Zodiacs and launch the boats into 4-foot seas (30°F and 20 kt winds--all personnel wearing dry suits); proceed for 60 nm (10 hours) then take the boats through the surf, caching 1 on the beach (while the other craft and 2 personnel depart); then hump 10 km (6.2 miles) over uneven terrain with 3 other SEALs (carrying 60 pounds of equipment each); lay-up for 6 hours, then retrace steps (i.e., 10 km hump, boat through surf zone, and 10 hour ride to extraction point).
- 2.58 Crawl for 3 days through a rat and mosquito infested jungle in 90°F temperature and 100% humidity, while carrying a 50 pound pack and 25 pounds of weapons and ammunition; lay up for 2 days, conduct sniper attack, then run 1 km (.62 miles) to extraction point.
- 2.58 Conduct a 12 day final training exercise in -15°F temperature, covering 60 km (37 miles) on skis while carrying a 100 pound pack.
- 2.49 Swim on surface a distance of 6 km (3 1/2 nm) wearing full close quarter battle (CQB) gear and flotation device and carrying 25 pounds of weapons/ammunition, in 60°F water; cling to the barnacle-covered leg of an oil platform for 45 minutes (while lead climber scales the structure); then climb a 3 tier caving ladder (90 feet), quietly pulling self and equipment onto deck of platform.

- 2.33 Perform a "duck drop" from an altitude of 65 feet; repair deflated section of Zodiac, then proceed 56 km (40 nm) to shore; change into dry clothing and cache boats; swim 2,000 meters (in patrol clothes) towing 30 pounds of equipment; then climb a 250 foot cliff; remain on top for 2 days, then retrace steps to extraction point (50°F air temperature).
- 2.24 Perform a "soft-duck drop" then transit 48 km (35 nm) to surf zone; guide boat through 5 foot surf to shore, then push the boat along the shore line for 8 km (5 miles) with 3 other SEALs; lay up for 4 days in the jungle (mosquito coast), then drive the boat 24 km (16 nm) to pick up 4 personnel and 800 pounds of gear; return at slow speed (requiring 8 hours to go the 16 nm), then recon the target for 4 more days before extraction.
- 2.20 Hike 110 km (68 miles) in winter gear, carrying a 60 pound pack and weapons and completing 5 mini FTXs during a 6 day period (in 25°F temperature with continuous rain and snow).
- 2.18 Ride in a Zodiac 8 km (5.75 nm) to a rocky beach in 0°F air temperature while wearing winter gear; then, during the next 9 days traverse 80 km (50 miles) of countryside (uneven terrain, briar patches) by humping (80% of the distance) and cross-country skiing (20%), while carrying a 100 pound pack and weapons.
- 2.17 Ride for 3 hours in a PBR, then for 1 hour in a CRRC on a jungle river (85°F air temperature and high humidity); climb a 350 foot cliff carrying a CAR-15 and 20 pounds of ammunition; descend 200 feet through dense vegetation; avoid, return, and eventually suppress intense enemy fire; then, carry wounded comrade 200 yards to extraction site with the assistance of 2 other SEALs.
- 2.00 Walk 115 km (72 miles) in 2 1/2 days carrying an M-60, 600 rounds of ammunition, and a rucksack (90 pounds total), laying up during the day (35°F temp at night and 80°F during the day).
- 1.96 Parachute into 42°F water wearing wet suits and Dräger UBA; tread water for 4 hours waiting for small diesel submarine; enter submerged submarine; travel for 3 days in submarine, then lock out and swim 3 km (2 nm) on surface followed by 6,500 meters underwater (4 hour dive); crawl across 100 meters of rock quay, then swim 4 km (3 nm) on surface to extraction point.
- 1.95 Operate a sampan on a jungle river for 4 hours at night; hike through uneven jungle terrain for 1 hour carrying light weapons; locate downed pilot and carry him back to the river with the assistance of 1 other person; return down river for 3 hours then evade intense machine gun fire, direct an air strike to suppress the fire, and successfully reach a forward operating base with the rescued pilot.
- 1.81 Parachute onto a rocky island then walk 2 km (1.2 miles) over uneven terrain to shore; retrieve cached kayak, then travel 24 km (17 nm) in rough seas to objective; travel 6

more miles in kayak, then climb a 2,500-foot mountain (mud and rocks) to the extraction point.

- 1.59 Navigate a rigid inflatable boat for 10 hours through heavy seas (30°F) with no moon while wearing a dry suit; retrieve personnel who were washed out of boat; fall out of boat and cling to outboard motor (which is operating); climb back into boat and continue operating it; crash boat on rocks then swim 200 meters through surf zone to beach carrying a 40 pound pack and weapons; change into light Gortex (winter gear lost on rocks) then hump 11 km (7 miles) over uneven terrain carrying packs and weapons; spend 2 days ashore hiking during the night and laying up during the day, with little sleep, in 35°F air temperature, wind and rain; finally, extraction by vehicle.
- 1.39 Ride in a CRRC for 1 hour to reach a sandy beach; cache the boat and proceed through thick jungle for 500 yards until coming under fire from a numerically superior enemy force; return fire and call in naval gunfire support; return to CRRC to prevent encirclement; then, quickly return to the engagement area through heavy fire to retrieve a critically injured comrade; carry the unconscious SEAL back to the beach, inflate his lifejacket, then tow him seaward for the next 2 hours until picked up by support craft.

## APPENDIX E



## PHYSICALLY DEMANDING SEAL MISSIONS

### IMPORTANCE

Mean  
Value

- 5.93 Perform a "duck drop," followed by an 29 km (21 nm) transit (3 hours) in 48°F air temperature, then swim a distance of 2,000 meters in 56°F water carrying a limpet mine and using a Dräger; return to Zodiac without limpet, then travel 6 km (4 nm) to extraction point (10 hours total).
- 5.92 Ride in a CRRC for 1 hour to reach a sandy beach; cache the boat and proceed through thick jungle for 500 yards until coming under fire from a numerically superior enemy force; return fire and call in naval gunfire support; return to CRRC to prevent encirclement; then, quickly return to the engagement area through heavy fire to retrieve a critically injured comrade; carry the unconscious SEAL back to the beach, inflate his lifejacket, then tow him seaward for the next 2 hours until picked up by support craft.
- 5.87 Operate a sampan on a jungle river for 4 hours at night; hike through uneven jungle terrain for 1 hour carrying light weapons; locate downed pilot and carry him back to the river with the assistance of 1 other person; return down river for 3 hours then evade intense machine gun fire, direct an air strike to suppress the fire, and successfully reach a forward operating base with the rescued pilot.
- 5.76 Ride for 3 hours in a PBR, then for 1 hour in a CRRC on a jungle river (85°F air temperature and high humidity); climb a 350 foot cliff carrying a CAR-15 and 20 pounds of ammunition; descend 200 feet through dense vegetation; avoid, return, and eventually suppress intense enemy fire; then, carry wounded comrade 200 yards to extraction site with the assistance of 2 other SEALs.
- 5.63 Walk (i.e., hump) 15 km (9 miles) over uneven terrain at night, carrying a 125-pound pack (with radios, etc.) in 70°F temperature to objective; then, retrace steps to extraction point.
- 5.37 Serve as point (trail breaker) for an element walking a distance of 42 km (26 miles) through dense jungle (up and down), in tropical heat and humidity, during a 3 day period, carrying a 60-pound pack and weapons.
- 5.37 Perform a "duck drop," followed by a 20 km (14 nm) transit in moderate seas and 65°F air temperature; beach and cache boat, and proceed on foot over 200 meters of strand; enter water and swim 4 km (2.8 nm) in current to objective; then, retrace steps to insertion point, during an 8-hour period.

- 5.33 Perform a "duck drop" into 39°F water, then conduct a 80 km (57 nm) over the horizon boat transit, then a 2 hour ship attack wearing wet suit and Dräger UBA; then, reboard Zodiac for 80 km (57 nm) ride to the extraction point.
- 5.30 Operate an SDV for a period of 4 hours (navigating from an offshore location to within an enemy harbor); bottom-out and secure the craft; remove LAM from storage compartment then swim 100 meters to target (with the assistance of 1 other team member); deploy the LAM; return to SDV and prepare for egress; operate SDV out of the harbor to rendezvous location; finally, dock SDV in DDS (a total of 9 hours in 65°F water, both personnel wearing wet suits).
- 5.24 Walk a distance of 42 km (26 miles) through dense jungle (up and down), in tropical heat and humidity, during a 3 day period, carrying a 40-pound pack, an M-60 (17 pounds), and 400 rounds of ammunition (40 pounds).
- 5.22 Travel for 5 hours in an open rubber boat in 40°F air temperature and 30-foot swells; beach the boat, cache/stage the equipment, and change from dry suit into dry clothes; then walk 26 km (16 miles) during the next 2 nights over uneven terrain carrying an 80-pound pack, sleeping in 2-hour increments, when possible, during a continuous rain.
- 5.21 Lock out of a submarine, then conduct a 97 km (69 nm) over the horizon transit in a Zodiac in 65°F air temperature (5 hours); enter 58°F water wearing wet suit and Dräger UBA, then swim a multi-ship limpet attack that requires 3 1/2 hours under water; reboard Zodiac for 97 km (69 nm) ride to the extraction point.
- 5.17 Perform a "duck drop" into 30°F waters then transit 123 km (90 nm) in a rigid inflatable boat while wearing a dry suit; enter water and swim 600 meters through surf zone to beach while carrying a 50 pound pack and weapons; cache boats and change from dry suit to winter gear on beach; hike 3 km (2 miles) up steep incline with packs; then hike all night for the next 5 nights, laying up during daylight; then, periodically help other platoon members carry downed pilot on stretcher over uneven terrain to extraction point.
- 5.13 Conduct R&S for 5 days in a jungle environment (95°F temperature and high humidity), while carrying 60 pounds of equipment and a sniper rifle (movement restricted by thick vegetation to 50 meters per hour).
- 5.04 Launch and operate an SDV for a period of 2 hours, then bottom-out the craft, swim 200 meters to shore carrying 90-pounds of equipment and weights and wearing a dry suit, then proceed overland 3 km to objective; retrace steps to extraction point.
- 5.00 Walk a distance of 20 km (12 miles) over uneven, snow-covered terrain in 30°F air temperature (crossing two 20-foot streams) during a 2-day period, wearing snowshoes and winter gear, and carrying an 80-pound pack.

- 4.96 Travel for 6 hours in a Zodiac in 0°F air temperature, then swim 600 meters in 36°F water, crossing the surf zone to the beach; change from wetsuit into winter gear and snow shoes, then walk 2 km (1.2 miles) over uneven terrain and snow to objective; retrace steps to extraction point (24 hours total).
- 4.95 Load all platoon equipment (e.g., 25 sets of twin 80s, 6 Zodiacs and 55 hp motors, 10 weapons boxes, 60 cruise boxes, para bags, radios, etc.) into a submarine via deck hatch in preparation for deployment, and secure equipment under torpedo racks, etc., with assistance of 9 other SEALs.
- 4.94 Walk a distance of 56 km (35 miles) from sea level to 4,000 feet, traversing marshy and rocky terrain (frequently on incline below the ridge line), walking at night and laying up during the day, for 3 days, carrying an 80 pound pack, in 30°F to 70°F air temperature.
- 4.85 Swim on surface a distance of 6 km (3 1/2 nm) wearing full close quarter battle (CQB) gear and flotation device and carrying 25 pounds of weapons/ammunition, in 60°F water; cling to the barnacle-covered leg of an oil platform for 45 minutes (while lead climber scales the structure); then climb a 3 tier caving ladder (90 feet), quietly pulling self and equipment onto deck of platform.
- 4.79 Crawl for 3 days through a rat and mosquito infested jungle in 90°F temperature and 100% humidity, while carrying a 50 pound pack and 25 pounds of weapons and ammunition; lay up for 2 days, conduct sniper attack, then run 1 km (.62 miles) to extraction point.
- 4.78 Serve as mission specialist riding in an SDV for a period of 3 hours in 68°F water, while wearing a wet suit and Mk 15/16 UBA (from an offshore location to within an enemy harbor that is filled with jelly fish); open canopy then swim 50 meters to target to deploy limpets (while jelly fish repeated sting exposed lip area); return to SDV and sit among jelly fish in storage compartment as the SDV is operated out of the harbor to the rendezvous location (a total of 8 hours in 68°F water--2 hours in jelly fish).
- 4.76 Serve as mission specialist riding in an SDV for a period of 3 hours in 65°F water, while wearing a light wet suit; exit SDV then swim 100 meters to shore; change into dry clothes then hump 2 km (1.2 miles) with 50 pound packs in 75°F air temperature; lay up overnight, then hump back to the beach for a 5-hour Zodiac extraction (a total of 2 days with only 3 quarts of water for each person).
- 4.74 Walk 60 km (37 miles) through the desert during a 5-day period, carrying a 100-pound rucksack, laying up during the day in 112°F temperature and walking over uneven terrain during nighttime hours (95°F).
- 4.74 Fast rope to the deck of a salvage ship with 60 pounds of equipment, then load 6 personnel and their equipment into 2 Zodiacs and launch the boats into 4-foot seas (30°F

and 20 kt winds--all personnel wearing dry suits); proceed for 60 nm (10 hours) then take the boats through the surf, caching 1 on the beach (while the other craft and 2 personnel depart); then hump 10 km (6.2 miles) over uneven terrain with 3 other SEALs (carrying 60 pounds of equipment each); lay-up for 6 hours, then retrace steps (i.e., 10 km hump, boat through surf zone, and 10 hour ride to extraction point).

- 4.63 Conduct a 12 day final training exercise in -15°F temperature, covering 60 km (37 miles) on skis while carrying a 100 pound pack.
- 4.44 Ride in a Zodiac 8 km (5.75 nm) to a rocky beach in 0°F air temperature while wearing winter gear; then, during the next 9 days traverse 80 km (50 miles) of countryside (uneven terrain, briar patches) by humping (80% of the distance) and cross-country skiing (20%), while carrying a 100 pound pack and weapons.
- 4.39 Parachute (static line) into the desert with 150 pound packs (day temp 110°F), then walk 75 km (47 miles) during the next 7 nights.
- 4.26 Parachute onto a rocky island then walk 2 km (1.2 miles) over uneven terrain to shore; retrieve cached kayak, then travel 24 km (17 nm) in rough seas to objective; travel 6 more miles in kayak, then climb a 2,500-foot mountain (mud and rocks) to the extraction point.
- 4.21 Hike 110 km (68 miles) in winter gear, carrying a 60 pound pack and weapons and completing 5 mini FTXs during a 6 day period (in 25°F temperature with continuous rain and snow).
- 4.17 Parachute into 42°F water wearing wet suits and Dräger UBA; tread water for 4 hours waiting for small diesel submarine; enter submerged submarine; travel for 3 days in submarine, then lock out and swim 3 km (2 nm) on surface followed by 6,500 meters underwater (4 hour dive); crawl across 100 meters of rock quay, then swim 4 km (3 nm) on surface to extraction point.
- 4.16 Conduct an administrative beach survey in 30°F water, for 2 1/2 hours, wearing a wet suit, mask, and fins.
- 4.09 Perform a "soft-duck drop" then transit 48 km (35 nm) to surf zone; guide boat through 5 foot surf to shore, then push the boat along the shore line for 8 km (5 miles) with 3 other SEALs; lay up for 4 days in the jungle (mosquito coast), then drive the boat 24 km (16 nm) to pick up 4 personnel and 800 pounds of gear; return at slow speed (requiring 8 hours to go the 16 nm), then recon the target for 4 more days before extraction.
- 4.08 Perform a "duck drop" from an altitude of 65 feet; repair deflated section of Zodiac, then proceed 56 km (40 nm) to shore; change into dry clothing and cache boats; swim 2,000

meters (in patrol clothes) towing 30 pounds of equipment; then climb a 250 foot cliff; remain on top for 2 days, then retrace steps to extraction point (50°F air temperature).

- 4.08 Conduct a beach feasibility survey, swimming a grid pattern for 8 hours, wearing a wetsuit, mask, and fins, and using a UBA and attack board, in 56°F water.
- 3.40 Navigate a rigid inflatable boat for 10 hours through heavy seas (30°F) with no moon while wearing a dry suit; retrieve personnel who were washed out of boat; fall out of boat and cling to outboard motor (which is operating); climb back into boat and continue operating it; crash boat on rocks then swim 200 meters through surf zone to beach carrying a 40 pound pack and weapons; change into light Gortex (winter gear lost on rocks) then hump 11 km (7 miles) over uneven terrain carrying packs and weapons; spend 2 days ashore hiking during the night and laying up during the day, with little sleep, in 35°F air temperature, wind and rain; finally, extraction by vehicle.
- 3.67 Walk 115 km (72 miles) in 2 1/2 days carrying an M-60, 600 rounds of ammunition, and a rucksack (90 pounds total), laying up during the day (35°F temp at night and 80°F during the day).

## APPENDIX F

## SEAL MISSION SEGMENTS

### COMPOSITE FREQUENCY SCORE

Mean  
Value

- 15.31 Swim for 3 hours underwater in 55°F temperature, wearing wetsuit, mask and fins, and using a Dräger UBA and attack board. (90%)
- 15.19 Drag a fully-loaded F470 Zodiac (approx 2,700 pounds) 50 meters onto a rocky beach with 5 other SEALs, then with 3 of the boat crew (while the other 2 provide security) quickly move all equipment and supplies across 200 meters of rocky beach and stage/cache gear in preparation for the overland phase of the mission. (86%)
- 15.17 Swim/dive a distance of 2,000-meters in 56°F water wearing a wet suit, fins and a Dräger and carrying a limpet mine, then swim 2,000 meters without the limpet mine. (89%)
- 14.95 Perform a rescue drag of a wounded comrade weighing 170 pounds, dragging him by the web gear a distance of 75 meters, with the assistance of 1 other SEAL. (89%)
- 14.65 Walk a distance of 13 km (8 miles) through dense jungle (up and down), in tropical heat and humidity, carrying a 40-pound pack, an M-60 (17 pounds), and 400 rounds of ammunition (40 pounds). (63%)
- 14.46 Climb a 3 tier caving ladder (90 feet) wearing full close quarter battle (CQB) gear and carrying 25 pounds of weapons and ammunition, pulling self and equipment onto deck of a steel structure. (64%)
- 14.35 Carry a disabled comrade (weighing 170 pounds) a distance of 200 meters, with the assistance of 2 other SEALs (3-man carry). (86%)
- 14.26 Fast rope from an altitude of 50 feet to the heaving deck of a ship while wearing close quarter battle (CQB) gear and carrying 50 pounds of equipment and weapons. (70%)
- 14.16 Carry a disabled comrade (weighing 170 pounds) a distance of 500 meters, using a makeshift stretcher, with the assistance of 3 other SEALs. (76%)
- 14.13 Carry a downed and disabled pilot (weighing 170 pounds) a distance of 100 feet across a beach and through the surf zone. (57%)
- 14.12 Guide a loaded F470 Zodiac through the surf zone to the beach, in heavy surf, with 3 other SEALs. (92%)

- 14.10 Walk 4 km (2.5 miles) over broken terrain within a 3-hour period in 75°F temperature, while carrying an M-60, 400 rounds of ammunition, and a 50-pound pack. (83%)
- 14.05 Remove the 55 hp outboard motor from the transom of a F470 Zodiac and replace with a spare motor, in 4-foot swells and 20°F (air) temperature, with the assistance of 1 other SEAL. (64%)
- 14.01 Walk (i.e., hump) 15 km (9 miles) over uneven terrain at night, carrying a 125-pound pack (with radios, etc.) in 70°F temperature to objective; retrace steps to extraction point. (68%)
- 14.01 Walk 12 km (7.4 miles) through the desert over uneven terrain (95°F) carrying a 100-pound rucksack. (82%)
- 13.96 Walk 17 km (10.5 miles) over broken terrain carrying an M-60 and 800 rounds of ammunition in 100°F temperature and high humidity. (47%)
- 13.89 Fast rope to the deck of ship from a height of 40 feet, carrying a 50-pound pack. (81%)
- 13.84 Walk 13 km (8 miles) over uneven terrain carrying an 80-pound pack during a continuous rain in 40°F air temperature. (91%)
- 13.82 Swim 1 km (3/4 nm) in strong current, carrying a limpet mine; place limpet, then swim back 1 km (3/4 nm) through current, in 60°F water (5 hours to complete the mission due to the current). (53%)
- 13.82 Carry an unconscious SEAL 100 meters through jungle, across 50 feet of sandy beach to water, inflate his flotation device, then tow him seaward for the next 2 hours until rescued. (12%)
- 13.74 Hike 3 km (2 miles) up a steep incline carrying a 50 pound pack and weapons in 30°F air temperature. (94%)
- 13.57 Walk a distance of 10 km (6.2 miles) over uneven, snow-covered terrain (crossing a 20-foot stream), wearing snowshoes and carrying an 80-pound pack in 32°F air temperature. (60%)
- 13.46 Walk a distance of 19 km (12 miles) (a steady incline), traversing marshy and rocky terrain (frequently on incline below the ridge line), while carrying an 80 pound pack, in 30°F air temperature. (65%)
- 13.43 Fast rope to deck of a steel structure from a height of 60 feet, carrying 100 pounds of equipment (pack, body armor, helmet, weapons, radios, etc.). (54%)



- 13.33 Carry a heavily-loaded weapons box (400 pounds) a distance of 100 feet with 1 other SEAL. (79%)
- 13.17 Swim 3 km (2 nm) on surface followed by 5,000 meters underwater (4 hour dive) wearing a wet suit, flotation device, and Dräger UBA in 42°F water temperature. (39%)
- 13.08 Climb a 250 foot cliff carrying 30 pounds of equipment in 50°F air temperature. (60%)
- 13.03 Ski cross-country for 8 hours wearing winter gear and carrying a 100-pound pack. (33%)
- 12.97 Swim 600 meters through surf zone to beach in 30°F waters, while wearing a dry suit and carrying a 50 pound pack and weapons. (51%)
- 12.96 Lift a heavily-loaded weapons box (400 pounds) to shoulder height to pass to personnel aboard an aircraft, with 3 other SEALs (i.e., a 4-man lift). (85%)
- 12.90 Carry a 55 hp outboard motor from a compartment 3 decks below to the deck of an aircraft carrier, through narrow passages and up ladders, with the assistance of 1 other SEAL, when possible. (51%)
- 12.78 Swim a swimmer line a distance of 100 meters through 7 foot surf while wearing light rubber, fins, and mask to perform a hydrographic reconnaissance, attempting to remain in the same spot for 1 1/2 hours (in heavy surf). (67%)
- 12.76 Climb a 350 foot cliff in tropical heat and humidity while carrying a CAR-15 and 20 pounds of ammunition. (47%)
- 12.71 Serve as DDS crew, making a 7-hour dive in 39°F water, wearing a wet suit. (5%)
- 12.56 Swim 3 km (2.3 nm) to shore in 45°F water temperature wearing dry suit, fins, and mask. (49%)
- 12.49 Remove LAM from SDV storage compartment then swim the device 100 meters to the objective (with the assistance of 1 other team member) in 65°F water, both personnel wearing wet suits. (18%)
- 12.47 Swim underwater 200 meters to shore using a Dräger and carrying 90-pounds of equipment and weights, while wearing a dry suit in 38°F water. (32%)
- 12.33 Swim on surface a distance of 5,000 meters (turtleback), followed by 1,000 meters on surface (snorkel), followed by 5,000 meters underwater (Dräger ), wearing wetsuit, fins, and UBA--a total of 11,000 meters to beach. (23%)

- 12.19 Swim 8 km (5.75 nm) in 62°F water and 1/2 kt current wearing wet suit, mask and fins. (75%)
- 12.15 Swim for 6 hours on the surface in 1/4 kt current and 72°F water, wearing a wetsuit, fins, and mask. (57%)
- 11.99 Perform a rescue swim dragging an incapacitated diver (who is wearing a flotation device) a distance of 500 meters while wearing a dry suit, mask and fins. (24%)
- 11.81 Swim on surface a distance of 6 km (4 nm) wearing full close quarter battle (CQB) gear and flotation device and carrying 25 pounds of weapons/ammunition, in 60°F water. (12%)
- 11.74 Climb a 600-foot cliff (a steep incline--no climbing equipment) carrying a 60-pound pack and 20 pounds of weapons and ammunition, while wearing a dry suit. (15%)
- 11.70 Drag a fully-loaded F470 Zodiac 2 km up a swiftly-moving river (average depth of 6 inches), with 3 other SEALs. (31%)
- 11.63 Alternate swimming on surface and underwater from sunset to sunrise (12 hours), carrying limpet mine, while wearing Dräger, shorty rubber and fins, in 78°F water. (10%)
- 11.08 Walk 1/2 mile carrying 2,000 rounds of .762 ammunition (130 pounds) and 20 pounds of additional equipment, in 85°F temperature, as quickly as possible. (30%)
- 10.59 Tread water for 4 hours (42°F water temperature) wearing a wet suit, flotation device, and Dräger UBA. (26%)
- 10.42 Travel by kayak a distance of 34 km (24 nm) in rough seas (65°F water temperature). (15%)
- 10.37 Perform a static line jump from a C-130 with a 120 pound rucksack (plus body weight = maximum load of a good parachute), hitting branches and unable to drop pack before landing. (24%)
- 9.90 Parachute into 42°F water wearing wet suits and Dräger UBA. (32%)

## APPENDIX G

## PHYSICALLY DEMANDING SEAL MISSION SEGMENTS

### DIFFICULTY TO PERFORM

Mean  
Value

- 5.99 Swim on surface a distance of 5,000 meters (turtleback), followed by 1,000 meters on surface (snorkel), followed by 5,000 meters underwater (Dräger ), wearing wetsuit, fins, and UBA--a total of 11,000 meters to beach.
- 5.94 Climb a 600-foot cliff (a steep incline--no climbing equipment) carrying a 60-pound pack and 20 pounds of weapons and ammunition, while wearing a dry suit.
- 5.90 Swim 1 km (3/4 nm) in strong current, carrying a limpet mine; place limpet, then swim back 1 km (3/4 nm) through current, in 60°F water (5 hours to complete the mission due to the current).
- 5.90 Alternate swimming on surface and underwater from sunset to sunrise (12 hours), carrying limpet mine, while wearing Dräger, shorty rubber and fins, in 78°F water.
- 5.83 Swim 3 km (2 nm) on surface followed by 5,000 meters underwater (4 hour dive) wearing a wet suit, flotation device, and Dräger UBA in 42°F water temperature.
- 5.78 Carry an unconscious SEAL 100 meters through jungle, across 50 feet of sandy beach to water, inflate his flotation device, then tow him seaward for the next 2 hours until rescued.
- 5.66 Walk 17 km (10.5 miles) over broken terrain carrying an M-60 and 800 rounds of ammunition in 100°F temperature and high humidity.
- 5.66 Climb a 3 tier caving ladder (90 feet) wearing full close quarter battle (CQB) gear and carrying 25 pounds of weapons and ammunition, pulling self and equipment onto deck of a steel structure.
- 5.60 Swim on surface a distance of 6 km (4 nm) wearing full close quarter battle (CQB) gear and flotation device and carrying 25 pounds of weapons/ammunition, in 60°F water.
- 5.49 Walk 1/2 mile carrying 2,000 rounds of .762 ammunition (130 pounds) and 20 pounds of additional equipment, in 85°F temperature, as quickly as possible.
- 5.47 Swim a swimmer line a distance of 100 meters through 7 foot surf while wearing light rubber, fins, and mask to perform a hydrographic reconnaissance, attempting to remain in the same spot for 1 1/2 hours (in heavy surf).

- 5.46 Walk (i.e., hump) 15 km (9 miles) over uneven terrain at night, carrying a 125-pound pack (with radios, etc.) in 70°F temperature to objective; retrace steps to extraction point.
- 5.45 Serve as DDS crew, making a 7-hour dive in 39°F water, wearing a wet suit.
- 5.34 Drag a fully-loaded F470 Zodiac (approx 2,700 pounds) 50 meters onto a rocky beach with 5 other SEALs, then with 3 of the boat crew (while the other 2 provide security) quickly move all equipment and supplies across 200 meters of rocky beach and stage/cache gear in preparation for the overland phase of the mission.
- 5.34 Climb a 250 foot cliff carrying 30 pounds of equipment in 50°F air temperature.
- 5.32 Walk a distance of 13 km (8 miles) through dense jungle (up and down), in tropical heat and humidity, carrying a 40-pound pack, an M-60 (17 pounds), and 400 rounds of ammunition (40 pounds).
- 5.31 Ski cross-country for 8 hours wearing winter gear and carrying a 100-pound pack.
- 5.31 Carry a 55 hp outboard motor from a compartment 3 decks below to the deck of an aircraft carrier, through narrow passages and up ladders, with the assistance of 1 other SEAL, when possible.
- 5.24 Walk a distance of 19 km (12 miles) (a steady incline), traversing marshy and rocky terrain (frequently on incline below the ridge line), while carrying an 80 pound pack, in 30°F air temperature.
- 5.23 Climb a 350 foot cliff in tropical heat and humidity while carrying a CAR-15 and 20 pounds of ammunition.
- 5.20 Travel by kayak a distance of 34 km (24 nm) in rough seas (65°F water temperature).
- 5.15 Swim 8 km (5.75 nm) in 62°F water and 1/2 kt current wearing wet suit, mask and fins.
- 5.08 Carry a downed and disabled pilot (weighing 170 pounds) a distance of 100 feet across a beach and through the surf zone.
- 5.07 Walk 12 km (7.4 miles) through the desert over uneven terrain (95°F) carrying a 100-pound rucksack.
- 5.07 Fast rope to deck of a steel structure from a height of 60 feet, carrying 100 pounds of equipment (pack, body armor, helmet, weapons, radios, etc.).
- 5.07 Drag a fully-loaded F470 Zodiac 2 km up a swiftly-moving river (average depth of 6 inches), with 3 other SEALs.

- 4.98 Swim for 6 hours on the surface in 1/4 kt current and 72°F water , wearing a wetsuit, fins, and mask.
- 4.95 Walk a distance of 10 km (6.2 miles) over uneven, snow-covered terrain (crossing a 20-foot stream), wearing snowshoes and carrying an 80-pound pack in 32°F air temperature.
- 4.93 Swim underwater 200 meters to shore using a Dräger and carrying 90-pounds of equipment and weights, while wearing a dry suit in 38°F water.
- 4.78 Carry a heavily-loaded weapons box (400 pounds) a distance of 100 feet with 1 other SEAL.
- 4.75 Swim 600 meters through surf zone to beach in 30°F waters, while wearing a dry suit and carrying a 50 pound pack and weapons.
- 4.74 Walk 13 km (8 miles) over uneven terrain carrying an 80-pound pack during a continuous rain in 40°F air temperature.
- 4.73 Perform a rescue drag of a wounded comrade weighing 170 pounds, dragging him by the web gear a distance of 75 meters, with the assistance of 1 other SEAL.
- 4.68 Remove the 55 hp outboard motor from the transom of a F470 Zodiac and replace with a spare motor, in 4-foot swells and 20°F (air) temperature, with the assistance of 1 other SEAL.
- 4.65 Perform a static line jump from a C-130 with a 120 pound rucksack (plus body weight = maximum load of a good parachute), hitting branches and unable to drop pack before landing.
- 4.58 Swim for 3 hours underwater in 55°F temperature, wearing wetsuit, mask and fins, and using a Dräger UBA and attack board.
- 4.53 Swim 3 km (2.3 nm) to shore in 45°F water temperature wearing dry suit, fins, and mask.
- 4.49 Perform a rescue swim dragging an incapacitated diver (who is wearing a flotation device) a distance of 500 meters while wearing a dry suit, mask and fins.
- 4.45 Swim/dive a distance of 2,000-meters in 56°F water wearing a wet suit, fins and a Dräger and carrying a limpet mine, then swim 2,000 meters without the limpet mine.
- 4.36 Fast rope from an altitude of 50 feet to the heaving deck of a ship while wearing close quarter battle (CQB) gear and carrying 50 pounds of equipment and weapons.

- 4.33 Tread water for 4 hours (42°F water temperature) wearing a wet suit, flotation device, and Dräger UBA.
- 4.29 Walk 4 km (2.5 miles) over broken terrain within a 3-hour period in 75°F temperature, while carrying an M-60, 400 rounds of ammunition, and a 50-pound pack.
- 4.26 Carry a disabled comrade (weighing 170 pounds) a distance of 500 meters, using a makeshift stretcher, with the assistance of 3 other SEALs.
- 4.21 Hike 3 km (2 miles) up a steep incline carrying a 50 pound pack and weapons in 30°F air temperature.
- 4.13 Carry a disabled comrade (weighing 170 pounds) a distance of 200 meters, with the assistance of 2 other SEALs (3-man carry).
- 4.07 Guide a loaded F470 Zodiac through the surf zone to the beach, in heavy surf, with 3 other SEALs.
- 4.03 Lift a heavily-loaded weapons box (400 pounds) to shoulder height to pass to personnel aboard an aircraft, with 3 other SEALs (i.e., a 4-man lift).
- 4.00 Remove LAM from SDV storage compartment then swim the device 100 meters to the objective (with the assistance of 1 other team member) in 65°F water, both personnel wearing wet suits.
- 3.90 Fast rope to the deck of ship from a height of 40 feet, carrying a 50-pound pack.
- 3.80 Parachute into 42°F water wearing wet suits and Dräger UBA.

## APPENDIX H



## PHYSICALLY DEMANDING SEAL MISSION SEGMENTS

### FREQUENCY PERFORMED

Mean  
Value

- 4.84 Swim for 3 hours underwater in 55°F temperature, wearing wetsuit, mask and fins, and using a Dräger UBA and attack board.
- 4.60 Swim/dive a distance of 2,000-meters in 56°F water wearing a wet suit, fins and a Dräger and carrying a limpet mine, then swim 2,000 meters without the limpet mine.
- 4.55 Walk 4 km (2.5 miles) over broken terrain within a 3-hour period in 75°F temperature, while carrying an M-60, 400 rounds of ammunition, and a 50-pound pack.
- 4.45 Lift a heavily-loaded weapons box (400 pounds) to shoulder height to pass to personnel aboard an aircraft, with 3 other SEALs (i.e., a 4-man lift).
- 4.34 Fast rope to the deck of ship from a height of 40 feet, carrying a 50-pound pack.
- 4.33 Guide a loaded F470 Zodiac through the surf zone to the beach, in heavy surf, with 3 other SEALs.
- 4.25 Hike 3 km (2 miles) up a steep incline carrying a 50 pound pack and weapons in 30°F air temperature.
- 4.25 Carry a heavily-loaded weapons box (400 pounds) a distance of 100 feet with 1 other SEAL.
- 4.24 Fast rope from an altitude of 50 feet to the heaving deck of a ship while wearing close quarter battle (CQB) gear and carrying 50 pounds of equipment and weapons.
- 4.10 Drag a fully-loaded F470 Zodiac (approx 2,700 pounds) 50 meters onto a rocky beach with 5 other SEALs, then with 3 of the boat crew (while the other 2 provide security) quickly move all equipment and supplies across 200 meters of rocky beach and stage/cache gear in preparation for the overland phase of the mission.
- 3.94 Walk 13 km (8 miles) over uneven terrain carrying an 80-pound pack during a continuous rain in 40°F air temperature.
- 3.94 Walk a distance of 13 km (8 miles) through dense jungle (up and down), in tropical heat and humidity, carrying a 40-pound pack, an M-60 (17 pounds), and 400 rounds of ammunition (40 pounds).

- 3.94 Perform a rescue drag of a wounded comrade weighing 170 pounds, dragging him by the web gear a distance of 75 meters, with the assistance of 1 other SEAL.
- 3.84 Carry a disabled comrade (weighing 170 pounds) a distance of 200 meters, with the assistance of 2 other SEALs (3-man carry).
- 3.78 Walk 12 km (7.4 miles) through the desert over uneven terrain (95°F) carrying a 100-pound rucksack.
- 3.58 Carry a disabled comrade (weighing 170 pounds) a distance of 500 meters, using a makeshift stretcher, with the assistance of 3 other SEALs.
- 3.56 Remove the 55 hp outboard motor from the transom of a F470 Zodiac and replace with a spare motor, in 4-foot swells and 20°F (air) temperature, with the assistance of 1 other SEAL.
- 3.54 Walk (i.e., hump) 15 km (9 miles) over uneven terrain at night, carrying a 125-pound pack (with radios, etc.) in 70°F temperature to objective; retrace steps to extraction point.
- 3.47 Walk a distance of 10 km (6.2 miles) over uneven, snow-covered terrain (crossing a 20-foot stream), wearing snowshoes and carrying an 80-pound pack in 32°F air temperature.
- 3.40 Remove LAM from SDV storage compartment then swim the device 100 meters to the objective (with the assistance of 1 other team member) in 65°F water, both personnel wearing wet suits.
- 3.32 Fast rope to deck of a steel structure from a height of 60 feet, carrying 100 pounds of equipment (pack, body armor, helmet, weapons, radios, etc.).
- 3.30 Walk 17 km (10.5 miles) over broken terrain carrying an M-60 and 800 rounds of ammunition in 100°F temperature and high humidity.
- 3.29 Walk a distance of 19 km (12 miles) (a steady incline), traversing marshy and rocky terrain (frequently on incline below the ridge line), while carrying an 80 pound pack, in 30°F air temperature.
- 3.27 Carry a downed and disabled pilot (weighing 170 pounds) a distance of 100 feet across a beach and through the surf zone.
- 3.25 Climb a 3 tier caving ladder (90 feet) wearing full close quarter battle (CQB) gear and carrying 25 pounds of weapons and ammunition, pulling self and equipment onto deck of a steel structure.

- 3.13 Swim 600 meters through surf zone to beach in 30°F waters, while wearing a dry suit and carrying a 50 pound pack and weapons.
- 3.08 Carry a 55 hp outboard motor from a compartment 3 decks below to the deck of an aircraft carrier, through narrow passages and up ladders, with the assistance of 1 other SEAL, when possible.
- 3.06 Swim 3 km (2.3 nm) to shore in 45°F water temperature wearing dry suit, fins, and mask.
- 3.06 Ski cross-country for 8 hours wearing winter gear and carrying a 100-pound pack.
- 2.83 Climb a 250 foot cliff carrying 30 pounds of equipment in 50°F air temperature.
- 2.82 Swim underwater 200 meters to shore using a Dräger and carrying 90-pounds of equipment and weights, while wearing a dry suit in 38°F water.
- 2.81 Swim a swimmer line a distance of 100 meters through 7 foot surf while wearing light rubber, fins, and mask to perform a hydrographic reconnaissance, attempting to remain in the same spot for 1 1/2 hours (in heavy surf).
- 2.78 Serve as DDS crew, making a 7-hour dive in 39°F water, wearing a wet suit.
- 2.76 Climb a 350 foot cliff in tropical heat and humidity while carrying a CAR-15 and 20 pounds of ammunition.
- 2.73 Swim 1 km (3/4 nm) in strong current, carrying a limpet mine; place limpet, then swim back 1 km (3/4 nm) through current, in 60°F water (5 hours to complete the mission due to the current).
- 2.58 Swim 3 km (2 nm) on surface followed by 5,000 meters underwater (4 hour dive) wearing a wet suit, flotation device, and Dräger UBA in 42°F water temperature.
- 2.45 Swim for 6 hours on the surface in 1/4 kt current and 72°F water , wearing a wetsuit, fins, and mask.
- 2.29 Swim on surface a distance of 6 km (4 nm) wearing full close quarter battle (CQB) gear and flotation device and carrying 25 pounds of weapons/ammunition, in 60°F water.
- 2.29 Swim 8 km (5.75 nm) in 62°F water and 1/2 kt current wearing wet suit, mask and fins.
- 2.26 Drag a fully-loaded F470 Zodiac 2 km up a swiftly-moving river (average depth of 6 inches), with 3 other SEALs.
- 2.19 Parachute into 42°F water wearing wet suits and Dräger UBA.

- 2.12 Swim on surface a distance of 5,000 meters (turtleback), followed by 1,000 meters on surface (snorkel), followed by 5,000 meters underwater (Dräger ), wearing wetsuit, fins, and UBA--a total of 11,000 meters to beach.
- 2.11 Tread water for 4 hours (42°F water temperature) wearing a wet suit, flotation device, and Dräger UBA.
- 2.07 Walk 1/2 mile carrying 2,000 rounds of .762 ammunition (130 pounds) and 20 pounds of additional equipment, in 85°F temperature, as quickly as possible.
- 2.03 Climb a 600-foot cliff (a steep incline--no climbing equipment) carrying a 60-pound pack and 20 pounds of weapons and ammunition, while wearing a dry suit.
- 1.92 Perform a static line jump from a C-130 with a 120 pound rucksack (plus body weight = maximum load of a good parachute), hitting branches and unable to drop pack before landing.
- 1.86 Carry an unconscious SEAL 100 meters through jungle, across 50 feet of sandy beach to water, inflate his flotation device, then tow him seaward for the next 2 hours until rescued.
- 1.83 Alternate swimming on surface and underwater from sunset to sunrise (12 hours), carrying limpet mine, while wearing Dräger, shorty rubber and fins, in 78°F water.
- 1.81 Travel by kayak a distance of 34 km (24 nm) in rough seas (65°F water temperature).
- 1.76 Perform a rescue swim dragging an incapacitated diver (who is wearing a flotation device) a distance of 500 meters while wearing a dry suit, mask and fins.

## APPENDIX I

## PHYSICALLY DEMANDING SEAL MISSION SEGMENTS

### IMPORTANCE

Mean  
Value

- 6.39 Carry a disabled comrade (weighing 170 pounds) a distance of 200 meters, with the assistance of 2 other SEALs (3-man carry).
- 6.34 Perform a rescue drag of a wounded comrade weighing 170 pounds, dragging him by the web gear a distance of 75 meters, with the assistance of 1 other SEAL.
- 6.33 Carry a disabled comrade (weighing 170 pounds) a distance of 500 meters, using a makeshift stretcher, with the assistance of 3 other SEALs.
- 6.21 Carry an unconscious SEAL 100 meters through jungle, across 50 feet of sandy beach to water, inflate his flotation device, then tow him seaward for the next 2 hours until rescued.
- 6.12 Swim/dive a distance of 2,000-meters in 56°F water wearing a wet suit, fins and a Dräger and carrying a limpet mine, then swim 2,000 meters without the limpet mine.
- 5.92 Drag a fully-loaded F470 Zodiac (approx 2,700 pounds) 50 meters onto a rocky beach with 5 other SEALs, then with 3 of the boat crew (while the other 2 provide security) quickly move all equipment and supplies across 200 meters of rocky beach and stage/cache gear in preparation for the overland phase of the mission.
- 5.90 Guide a loaded F470 Zodiac through the surf zone to the beach, in heavy surf, with 3 other SEALs.
- 5.89 Swim for 3 hours underwater in 55°F temperature, wearing wetsuit, mask and fins, and using a Dräger UBA and attack board.
- 5.84 Perform a rescue swim dragging an incapacitated diver (who is wearing a flotation device) a distance of 500 meters while wearing a dry suit, mask and fins.
- 5.82 Carry a downed and disabled pilot (weighing 170 pounds) a distance of 100 feet across a beach and through the surf zone.
- 5.81 Remove the 55 hp outboard motor from the transom of a F470 Zodiac and replace with a spare motor, in 4-foot swells and 20°F (air) temperature, with the assistance of 1 other SEAL.

- 5.66 Fast rope from an altitude of 50 feet to the heaving deck of a ship while wearing close quarter battle (CQB) gear and carrying 50 pounds of equipment and weapons.
- 5.65 Fast rope to the deck of ship from a height of 40 feet, carrying a 50-pound pack.
- 5.58 Climb a 3 tier caving ladder (90 feet) wearing full close quarter battle (CQB) gear and carrying 25 pounds of weapons and ammunition, pulling self and equipment onto deck of a steel structure.
- 5.43 Walk 4 km (2.5 miles) over broken terrain within a 3-hour period in 75°F temperature, while carrying an M-60, 400 rounds of ammunition, and a 50-pound pack.
- 5.40 Walk a distance of 13 km (8 miles) through dense jungle (up and down), in tropical heat and humidity, carrying a 40-pound pack, an M-60 (17 pounds), and 400 rounds of ammunition (40 pounds).
- 5.32 Walk 12 km (7.4 miles) through the desert over uneven terrain (95°F) carrying a 100-pound rucksack.
- 5.28 Hike 3 km (2 miles) up a steep incline carrying a 50 pound pack and weapons in 30°F air temperature.
- 5.27 Remove LAM from SDV storage compartment then swim the device 100 meters to the objective (with the assistance of 1 other team member) in 65°F water, both personnel wearing wet suits.
- 5.26 Swim 1 km (3/4 nm) in strong current, carrying a limpet mine; place limpet, then swim back 1 km (3/4 nm) through current, in 60°F water (5 hours to complete the mission due to the current).
- 5.21 Walk 13 km (8 miles) over uneven terrain carrying an 80-pound pack during a continuous rain in 40°F air temperature.
- 5.20 Walk a distance of 10 km (6.2 miles) over uneven, snow-covered terrain (crossing a 20-foot stream), wearing snowshoes and carrying an 80-pound pack in 32°F air temperature.
- 5.09 Swim 600 meters through surf zone to beach in 30°F waters, while wearing a dry suit and carrying a 50 pound pack and weapons.
- 5.09 Fast rope to deck of a steel structure from a height of 60 feet, carrying 100 pounds of equipment (pack, body armor, helmet, weapons, radios, etc.).

- 5.06 Walk (i.e., hump) 15 km (9 miles) over uneven terrain at night, carrying a 125-pound pack (with radios, etc.) in 70°F temperature to objective; retrace steps to extraction point.
- 5.04 Walk 17 km (10.5 miles) over broken terrain carrying an M-60 and 800 rounds of ammunition in 100°F temperature and high humidity.
- 5.00 Ski cross-country for 8 hours wearing winter gear and carrying a 100-lb pack.
- 4.97 Walk a distance of 19 km (12 miles) (a steady incline), traversing marshy and rocky terrain (frequently on incline below the ridge line), while carrying an 80 pound pack, in 30°F air temperature.
- 4.97 Swim 3 km (2.3 nm) to shore in 45°F water temperature wearing dry suit, fins, and mask.
- 4.95 Climb a 250 foot cliff carrying 30 pounds of equipment in 50°F air temperature.
- 4.94 Climb a 350 foot cliff in tropical heat and humidity while carrying a CAR-15 and 20 pounds of ammunition.
- 4.84 Swim 3 km (2 nm) on surface followed by 5,000 meters underwater (4 hour dive) wearing a wet suit, flotation device, and Dräger UBA in 42°F water temperature.
- 4.76 Swim underwater 200 meters to shore using a Dräger and carrying 90-pounds of equipment and weights, while wearing a dry suit in 38°F water.
- 4.75 Swim 8 km (5.75 nm) in 62°F water and 1/2 kt current wearing wet suit, mask and fins.
- 4.73 Swim for 6 hours on the surface in 1/4 kt current and 72°F water , wearing a wetsuit, fins, and mask.
- 4.57 Serve as DDS crew, making a 7-hour dive in 39°F water, wearing a wet suit.
- 4.57 Carry a 55 hp outboard motor from a compartment 3 decks below to the deck of an aircraft carrier, through narrow passages and up ladders, with the assistance of 1 other SEAL, when possible.
- 4.54 Swim a swimmer line a distance of 100 meters through 7 foot surf while wearing light rubber, fins, and mask to perform a hydrographic reconnaissance, attempting to remain in the same spot for 1 1/2 hours (in heavy surf).
- 4.54 Lift a heavily-loaded weapons box (400 pounds) to shoulder height to pass to personnel aboard an aircraft, with 3 other SEALs (i.e., a 4-man lift).



- 4.43 Drag a fully-loaded F470 Zodiac 2 km up a swiftly-moving river (average depth of 6 inches), with 3 other SEALs.
- 4.41 Carry a heavily-loaded weapons box (400 pounds) a distance of 100 feet with 1 other SEAL.
- 4.33 Swim on surface a distance of 5,000 meters (turtleback), followed by 1,000 meters on surface (snorkel), followed by 5,000 meters underwater (Dräger), wearing wetsuit, fins, and UBA--a total of 11,000 meters to beach.
- 4.18 Tread water for 4 hours (42°F water temperature) wearing a wet suit, flotation device, and Dräger UBA.
- 4.18 Swim on surface a distance of 6 km (4 nm) wearing full close quarter battle (CQB) gear and flotation device and carrying 25 pounds of weapons/ammunition, in 60°F water.
- 4.08 Alternate swimming on surface and underwater from sunset to sunrise (12 hours), carrying limpet mine, while wearing Dräger, shorty rubber and fins, in 78°F water.
- 3.95 Parachute into 42°F water wearing wet suits and Dräger UBA.
- 3.88 Climb a 600-foot cliff (a steep incline--no climbing equipment) carrying a 60-pound pack and 20 pounds of weapons and ammunition, while wearing a dry suit.
- 3.83 Perform a static line jump from a C-130 with a 120 pound rucksack (plus body weight = maximum load of a good parachute), hitting branches and unable to drop pack before landing.
- 3.62 Walk 1/2 mile carrying 2,000 rounds of .762 ammunition (130 pounds) and 20 pounds of additional equipment, in 85°F temperature, as quickly as possible.
- 3.51 Travel by kayak a distance of 34 km (24 nm) in rough seas (65°F water temperature).

## APPENDIX J

## SEAL THERMAL STRESS ACTIVITIES

### COMPOSITE IMPORTANCE SCORE

Mean  
Value

- 14.29 Operate an SDV for a period of 6 hours in 42°F water wearing a wet suit.
- 13.99 Crawl for 4-hours while wearing a full (and new) ghillie suit in 85°F temperature and high humidity, while dragging a bag with 40 pounds of weapons and optics.
- 13.68 Ride in the cargo compartment of an SDV for a period of 6 hours in 42°F water, while wearing a wet suit.
- 13.49 Operate an SDV from an offshore location to within an enemy harbor; deploy limpet mines on 3 targets; then operate SDV out of the harbor to rendezvous location; finally, dock SDV in DDS (a total of 8 hours in 38°F water, all personnel wearing thick wet suits).
- 13.07 Serve as DDS crew, making 7-hour dives for 5 consecutive days in 39°F water, wearing a wet suit.
- 12.94 Lay motionless in snow (13°F air temperature) for a period of 3 hours wearing winter gear and holding/aiming a sniper rifle.
- 12.92 Ride for 6 hours in a Zodiac in 0°F air temperature and 36°F water temperature, wearing a dry suit.
- 12.83 Ride for 5 hours in an open rubber boat in 40°F air temperature, 50°F water temperature, and 30-foot swells; beach the boat, cache/stage the equipment, and change from dry suit into dry clothes.
- 12.36 Swim 600 meters in 36°F water, crossing the surf zone to the beach; change from wetsuit into winter gear and snow shoes in 0°F air temperature; then, walk 2 km (1.2 miles) over uneven terrain and snow to objective.
- 12.27 Ride in a Zodiac for 60 nm (10 hours) in 30°F air temperature (and 20 kt winds), 48°F water temperature, and 4-foot seas--all personnel wearing dry suits.
- 11.65 Ride in a Zodiac over a distance of 64 km (46 nm) in 0°F air temperature, 40°F water temperature, and sea state 3, while wearing lightweight Gortex (a total of 8 hours).

- 11.61 Ride a distance of 72 km (52 nm) in a Zodiac (a planned 6-hour transit that required 12 hours to complete) in 15 kt winds, 32°F air temperature and 50°F water temperature, wearing a dry suit.
- 11.39 Ride for 12-hours in a Zodiac with 6 other personnel, in 20°F air temperature, 48°F water temperature, and 4-foot swells, wearing a failed dry suit.
- 11.31 Ride for 4 hours in a (very) crowded UH-60 (25 passengers!) while wearing close quarter battle (CQB) gear, in 98°F temperature (waiting to board a ship).
- 11.00 Ride a distance of 125 km (90 nm) in a rigid Zodiac in 20°F air temperature and 30°F water temperature, while wearing a dry suit.

## APPENDIX K

## PHYSICALLY DEMANDING SEAL THERMAL STRESS ACTIVITIES

### DIFFICULTY TO PERFORM

Mean  
Value

- 6.03 Operate an SDV from an offshore location to within an enemy harbor; deploy limpet mines on 3 targets; then operate SDV out of the harbor to rendezvous location; finally, dock SDV in DDS (a total of 8 hours in 38°F water, all personnel wearing thick wet suits).
- 5.99 Serve as DDS crew, making 7-hour dives for 5 consecutive days in 39°F water, wearing a wet suit.
- 5.85 Ride in a Zodiac over a distance of 64 km (46 nm) in 0°F air temperature, 40°F water temperature, and sea state 3, while wearing lightweight Gortex (a total of 8 hours).
- 5.85 Ride for 12-hours in a Zodiac with 6 other personnel, in 20°F air temperature, 48°F water temperature, and 4-foot swells, wearing a failed dry suit.
- 5.81 Lay motionless in snow (13°F air temperature) for a period of 3 hours wearing winter gear and holding/aiming a sniper rifle.
- 5.70 Ride in the cargo compartment of an SDV for a period of 6 hours in 42°F water, while wearing a wet suit.
- 5.60 Ride a distance of 72 km (52 nm) in a Zodiac (a planned 6-hour transit that required 12 hours to complete) in 15 kt winds, 32°F air temperature and 50°F water temperature, wearing a dry suit.
- 5.57 Operate an SDV for a period of 6 hours in 42°F water wearing a wet suit.
- 5.44 Crawl for 4-hours while wearing a full (and new) ghillie suit in 85°F temperature and high humidity, while dragging a bag with 40 pounds of weapons and optics.
- 5.39 Ride a distance of 125 km (90 nm) in a rigid Zodiac in 20°F air temperature and 30°F water temperature, while wearing a dry suit.
- 5.29 Ride in a Zodiac for 60 nm (10 hours) in 30°F air temperature (and 20 kt winds), 48°F water temperature, and 4-foot seas--all personnel wearing dry suits.
- 5.29 Ride for 5 hours in an open rubber boat in 40°F air temperature, 50°F water temperature, and 30-foot swells; beach the boat, cache/stage the equipment, and change from dry suit into dry clothes.

- 5.26 Swim 600 meters in 36°F water, crossing the surf zone to the beach; change from wetsuit into winter gear and snow shoes in 0°F air temperature; then, walk 2 km (1.2 miles) over uneven terrain and snow to objective.
- 5.13 Ride for 4 hours in a (very) crowded UH-60 (25 passengers!) while wearing close quarter battle (CQB) gear, in 98°F temperature (waiting to board a ship).
- 4.99 Ride for 6 hours in a Zodiac in 0°F air temperature and 36°F water temperature, wearing a dry suit.

## APPENDIX L



## PHYSICALLY DEMANDING SEAL THERMAL STRESS ACTIVITIES

### FREQUENCY PERFORMED

Mean  
Value

- 3.77 Operate an SDV for a period of 6 hours in 42°F water wearing a wet suit.
- 3.30 Crawl for 4-hours while wearing a full (and new) ghillie suit in 85°F temperature and high humidity, while dragging a bag with 40 pounds of weapons and optics.
- 3.25 Ride in the cargo compartment of an SDV for a period of 6 hours in 42°F water, while wearing a wet suit.
- 2.83 Ride for 6 hours in a Zodiac in 0°F air temperature and 36°F water temperature, wearing a dry suit.
- 2.74 Operate an SDV from an offshore location to within an enemy harbor; deploy limpet mines on 3 targets; then operate SDV out of the harbor to rendezvous location; finally, dock SDV in DDS (a total of 8 hours in 38°F water, all personnel wearing thick wet suits).
- 2.73 Ride for 5 hours in an open rubber boat in 40°F air temperature, 50°F water temperature, and 30-foot swells; beach the boat, cache/stage the equipment, and change from dry suit into dry clothes.
- 2.64 Serve as DDS crew, making 7-hour dives for 5 consecutive days in 39°F water, wearing a wet suit.
- 2.51 Ride in a Zodiac for 60 nm (10 hours) in 30°F air temperature (and 20 kt winds), 48°F water temperature, and 4-foot seas--all personnel wearing dry suits.
- 2.42 Swim 600 meters in 36°F water, crossing the surf zone to the beach; change from wetsuit into winter gear and snow shoes in 0°F air temperature; then, walk 2 km (1.2 miles) over uneven terrain and snow to objective.
- 2.32 Lay motionless in snow (13°F air temperature) for a period of 3 hours wearing winter gear and holding/aiming a sniper rifle.
- 2.22 Ride for 4 hours in a (very) crowded UH-60 (25 passengers!) while wearing close quarter battle (CQB) gear, in 98°F temperature (waiting to board a ship).
- 2.06 Ride in a Zodiac over a distance of 64 km (46 nm) in 0°F air temperature, 40°F water temperature, and sea state 3, while wearing lightweight Gortex (a total of 8 hours).

- 2.03 Ride a distance of 72 km (52 nm) in a Zodiac (a planned 6-hour transit that required 12 hours to complete) in 15 kt winds, 32°F air temperature and 50°F water temperature, wearing a dry suit.
- 1.88 Ride a distance of 125 km (90 nm) in a rigid Zodiac in 20°F air temperature and 30°F water temperature, while wearing a dry suit.
- 1.80 Ride for 12-hours in a Zodiac with 6 other personnel, in 20°F air temperature, 48°F water temperature, and 4-foot swells, wearing a failed dry suit.

## APPENDIX M

## PHYSICALLY DEMANDING SEAL THERMAL STRESS ACTIVITIES

### IMPORTANCE

Mean  
Value

- 5.29 Crawl for 4-hours while wearing a full (and new) ghillie suit in 85°F temperature and high humidity, while dragging a bag with 40 pounds of weapons and optics.
- 5.11 Ride for 6 hours in a Zodiac in 0°F air temperature and 36°F water temperature, wearing a dry suit.
- 5.01 Operate an SDV for a period of 6 hours in 42°F water wearing a wet suit.
- 4.93 Lay motionless in snow (13°F air temperature) for a period of 3 hours wearing winter gear and holding/aiming a sniper rifle.
- 4.84 Ride for 5 hours in an open rubber boat in 40°F air temperature, 50°F water temperature, and 30-foot swells; beach the boat, cache/stage the equipment, and change from dry suit into dry clothes.
- 4.78 Ride in the cargo compartment of an SDV for a period of 6 hours in 42°F water, while wearing a wet suit.
- 4.76 Operate an SDV from an offshore location to within an enemy harbor; deploy limpet mines on 3 targets; then operate SDV out of the harbor to rendezvous location; finally, dock SDV in DDS (a total of 8 hours in 38°F water, all personnel wearing thick wet suits).
- 4.74 Swim 600 meters in 36°F water, crossing the surf zone to the beach; change from wetsuit into winter gear and snow shoes in 0°F air temperature; then, walk 2 km (1.2 miles) over uneven terrain and snow to objective.
- 4.59 Ride in a Zodiac for 60 nm (10 hours) in 30°F air temperature (and 20 kt winds), 48°F water temperature, and 4-foot seas--all personnel wearing dry suits.
- 4.49 Serve as DDS crew, making 7-hour dives for 5 consecutive days in 39°F water, wearing a wet suit.
- 4.03 Ride for 4 hours in a (very) crowded UH-60 (25 passengers!) while wearing close quarter battle (CQB) gear, in 98°F temperature (waiting to board a ship).

- 4.01 Ride a distance of 72 km (52 nm) in a Zodiac (a planned 6-hour transit that required 12 hours to complete) in 15 kt winds, 32°F air temperature and 50°F water temperature, wearing a dry suit.
- 3.85 Ride in a Zodiac over a distance of 64 km (46 nm) in 0°F air temperature, 40°F water temperature, and sea state 3, while wearing lightweight Gortex (a total of 8 hours).
- 3.84 Ride a distance of 125 km (90 nm) in a rigid Zodiac in 20°F air temperature and 30°F water temperature, while wearing a dry suit.
- 3.77 Ride for 12-hours in a Zodiac with 6 other personnel, in 20°F air temperature, 48°F water temperature, and 4-foot swells, wearing a failed dry suit.

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